THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. IX. No. 192—12th YEAR.] LONDON, FEBRUARY 28, 1860. [Subscription per Ann. { 15s. in Advance 18s Credit.] DOUBLE No. Price 1s.

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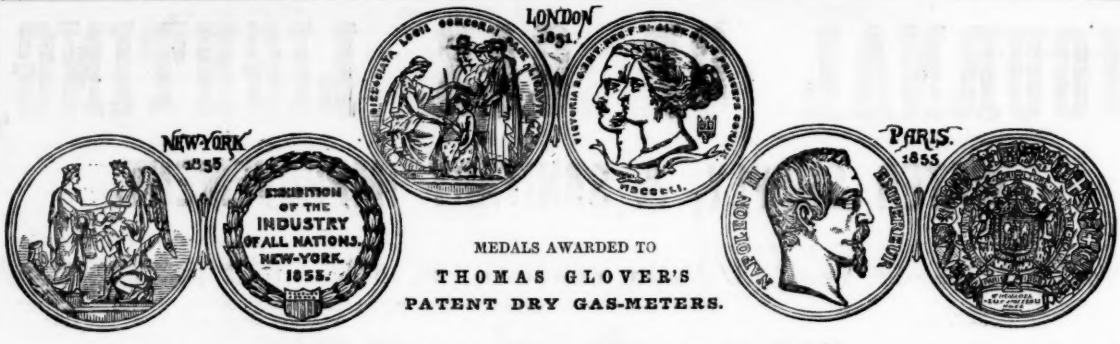
JOURNAL OF GAS LIGHTING ONE PENNY NEWSPAPER



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PATENT DRY GAS-METER MANUFACTURER,

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Established 1844.

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Graduated by the Standard Cubic Foot.

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TO CORRESPONDENTS.

W. G., *and other American correspondents, cause the receipt of their communications to be delayed by addressing them to "The London Journal of Gas Lighting" instead of to "The Journal of Gas Lighting, London," no publication with the former title being known to the Post Office authorities. If the address of the editor's office, No. 42, Parliament Street, or of the publisher's office, No. 11, Bolt Court, Fleet Street, be added, it will ensure immediate delivery.*

A Young Gasfitter.—*The sparks may be produced by the ignition of particles of matter floating in the air, or, according to some authorities, by the presence of naphthaline in the gas. The phenomenon has not been satisfactorily accounted for, but no injurious effect on books has ever been assigned to this cause.*

NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

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All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 28, 1860.

NOTES UPON PASSING EVENTS.

A VERY startling commentary upon the glaring impropriety of naming such a political nonentity as Mr. Cowper to the post of First Commissioner of Works has been lately furnished by the proceedings of certain interested parties in the matter of the operations for the improvement of the Serpentine. So long as Mr. Fitzroy lived, the dealers in hydraulic machinery who now inspire Sir J. Shelley and the *Times*, knew that there was no use in their attempting to stop the progress of the works actually commenced, and already half completed; because Mr. Fitzroy was a man of character, and he had dared to think for himself, without heeding the thunders of the briefless barristers who write for the "leading journal." Mr. Fitzroy, indeed, had paid very serious attention to this Serpentine question, and he took the precaution to consult an engineer of known ability, who had no tradesman's views to warp his judgment. But, no sooner was Mr. Fitzroy removed and Mr. Cooper nominated, than the screw of the *Times* was put upon him, no doubt through some such family interest as the one which kept the delinquencies of the Gloucester bribery case from the public; and, as Mr. Cowper seems to be deficient in moral courage, the commands of the leading journal will be obeyed. Really, if our newspaper press is thus to become a fourth power of the realm, more tyrannical or more influential than the rest, it is high time that the mysterious and irresponsible influence of its writers should be destroyed; and, for the personal safety of the general public, it almost becomes necessary to introduce that French law into our country, by which every writer in a newspaper should be compelled to sign whatever he may write. When the writers upon the regular staff of the *Times* use their covered position to attack individuals, the public is apt to attach a vague, shadowy, but important influence to the opinions the set, the mysterious WE, express; but, if it were known that the opinions in question were really only those of ordinary individuals, they would simply pass for what they might be worth. It is even questionable whether Mr. Cowper himself would listen to one of the writers of the *Times*, in his personal or individual capacity. No member of the existing government, however, dares to oppose the writers of that journal in their collective capacity.

As to the present ground of attack of the *Times* upon the works for cleansing the waters of the Serpentine, they are the most futile of any which have been put forward. A foolish fellow, in spite of warning, persisted in skating on a dangerous part of the River, and was drowned; and, thereupon, an outcry is raised that the Government should take upon itself, for the future, to protect all similar fools from the consequences of their own imprudence. It is to be observed, however, that even if it were determined to fill up the bed of the Serpentine to a regular depth of 5 feet, and to cover it with concrete, that operation could be effected without interfering in any way with the principle of Mr. Hawksley's scheme; and, therefore, there is either wilful ignorance, or "*malice prepense*," in the attack upon that scheme, because the bed of the River is not to be regulated at present to suit the views of the Contractors, who desire to spoil inferior lime and ballast in the same way as was done in St. James's Park. The two questions, of the purification of the water, and of the regularization of the bed, are very distinct from one another. The former was decided by the most competent authorities, and should not in fairness be again opened: the latter may still be a subject for discussion, but it is more than doubtful whether the inhabitants of the rest of England would approve the enormous outlay which must be incurred for the protection of a few fool-hardy dwellers in the Metropolis.

A short, and rather more than ordinarily vigorous, discussion took place lately at the Royal Institute of British Architects, on the subject (virtually) of the origin and causation of disease, after the perusal of an elaborate paper on the construction and management of human habitations, by Dr. Druitt. There was in the paper itself nothing that was new; and it might, indeed, have been described as a *réchauffé* of the Board of Health and Registrar-General's theories, expressed in the sonorous language Mr. Simon has made fashionable. On account of the paper itself then, little required to be said; but, both from the course of the discussion, and from the manner in which it has been reported, it seems that some further notice of the whole question would be desirable, if it were only for the purpose of enlightening the public as to the real importance to be attached to the conclusions said to be arrived at by the so-called Scientific Meetings.

On this occasion, Messrs. Burnell, Haywood, and Papworth took distinct objections to the theory that foul smells were necessarily causes of the numerous classes of disease which Dr. Druitt, and the official writers on Sanitary matters, connect with them in the relation of cause and effect. They also expressed their belief that it was a matter of far greater importance to devolop the moral and physical education of all classes

of society than it was to demolish whole quarters of the town, even for the purpose of replacing them by new, and more healthily constructed, buildings than those which now so sadly disfigure the Metropolis. Thereupon, Mr. Godwin, the Chairman of the meeting, after repeating some of the vague generalities of the Board of Health School, and some self-evident truisms, which nobody had questioned, so far forgot his position as chairman, as to make a rather violent speech, in which he protested against the tendency of the remarks which had been made, and even went so far as to assert, in effect, that the mere attempt to discuss the official doctrines upon the origin and causation of disease was but a covert mode of obstructing the advance of Sanitary Science. The discussion has been reported in the *Builder* and in the *Building News*, in the main, with tolerable accuracy; but there are some such curious blunders in both the Reports, that, unless the Institute of British Architects take some measures to ensure their correction in the official account of the Meeting, it will behove professional men hereafter to avoid speaking in that room. At the same time, it is important to observe that there was something very unfair in the conduct of Mr. Godwin in pretending, really *ex cathedra*, to compromise the Institute of British Architects to his crotchets on what he is pleased to call Sanitary Science. The rule of a public discussion is, that when a speaker has made his speech, he is only entitled to explain any obscure or evidently misunderstood statement; and that the Chairman's duty is only to resume, and occasionally to comment upon, the discussion. Mr. Godwin, then, had no right to take, from the Chair, any part in the discussion; still less had he a right to impugn the motives of those who differed from him in opinion. However, this system of abusing those whom it is not easy to answer, has always been a favourite one with the advocates of the Board of Health; and perhaps it may enable the public to estimate the amount of sincerity and good faith of the clique.

By the way of illustrating the practical result of the working of one of the modern schemes for doing everything for the people, instead of teaching them to act and think for themselves, we may here mention that the Preston Baths and Washouses last year entailed upon the ratepayers of the town a loss of £580. It would be very desirable that other statistics of this Bath and Washhouse measure were published; because society in general has a direct interest in preventing the repetition of such misapplications of public funds, such perversions of the feeling of charity, as have taken place under the influence of this particular movement. We are very far indeed from asserting that those institutions are in themselves injurious: nay, we distinctly assert that they are extremely valuable, and that, so long as they are maintained without charge upon the community, they are admirable objects for the exercise of private benificence. The exception we take to the recent mode of conducting the movement in favour of the development of the education of the poor in the practice of the quasi virtue of cleanliness, lies in the compulsory character that movement has assumed, and in the long train of social aud moral inconveniences which must follow from the establishment of the principle of casting upon society the duty of providing for the daily wants of the individual members of the state. Why should the prudent man, who invests the savings of his industry in a gas or water company of his own town, for instance, be made to pay towards the rates firstly in his capacity as a householder, and secondly as a partner in the supposed concerns, in order perhaps that his improvident neighbour may bathe and wash for less than prime cost? The whole system of this compulsory charity is wrong, from first to last.

Dr. Letheby has done us the honour to call attention to a mistake which we, in common with the rest of the world, have made in the conclusions to be drawn from some of his recent reports. It seems that the Doctor had stated, in one of those documents, that the mortality in one of the sub-districts of the City was at the rate of 18 per 1000, and that the public press had by mistake printed this as 8 per 1000. We took the liberty, at the time, to express our doubts as to the correctness of the return; but not having any special means of correcting the printed statements of the proceedings in these matters, we could only assume that some error had crept into the test of the Doctor's statement. It was (we hope that he will pardon us for saying so) his business to correct the erroneous returns which were published under his name; and the more especially at the present time, when so much false reasoning prevails on Sanitary matters. and such desperate efforts are being made to prove that a natural rate of mortality exists. If Dr. Letheby then feels annoyed at the remarks we made upon the now acknowledged error, it seems to us that he has only himself to blame; but, be that as it may, the mistake in question should lead the public at all times to suspect that there may be some analogous error when very startling statistical returns are put forward, even by authority.

Really the bad faith of the covert attacks upon the Metropolitan Water supply, by the Registrar-General and Dr. R. D. Thompson, is becoming unbearable. Notwithstanding the statement we quoted in our last number about the milkiness of the Loch Katrine water, as distributed in Glasgow, the old stock analysis, in which that water is made to appear as the nearest practicable approach to purity, is again repeated in the Tables of the London waters, in order to point the moral of the insinuations against the latter. We do not hesitate to say that in private life such a course of proceeding would be considered to be at least sharp practice, even if not positively unfair, It seems that in public life another code of morals prevails; and that any measure by which the success of a potical system may be secured, is tolerated.

In the country districts, there does not seem to be much doing in the various branches of engineering this JOURNAL especially considers. The well for the Maidstone Water-Works is rapidly advancing towards completion, and the Margate Water-Works Company is executing with great rapidity the connexions of the private houses with the mains. The Metropolitan Board of Works appears to be taking timely precautions for securing a large supply of the perchloride of iron, no doubt with a view of dealing with the foul waters of the Thames from the earliest indications of their unwholesomeness in the course of the next warm season; and the board is urging forward the great work of the intercepting sewers. The town of Barnsley is about to form a new cemetery; and Hull is about to carry out one of those inestimable benefits to the poor, a people's park, mainly through the liberal contributions of one truly charitable individual. But the most important movement we have lately noticed, with respect to the execution of public works, is the one in favour of the formation of harbours of refuge, especially on our eastern coast. In consequence of the peculiar law of the tides, on this part of our shores, the formation of such harbours must always be a matter of difficulty, expense, and danger; and it has unfortunately happened, hitherto, that all the attempts of government to supply this national want have been so ill-directed as to leave the danger untouched. The recent reports on Filey Bay, &c,. do not seem to us to be more philosophically conceived than the usual run of our official publications; and we cannot, therefore, refrain from urging our public authorities to do nothing rashly in an affair of such importance. Still, the dangers of our coasting-trade are so great, that a prompt solution of this problem is essential; and we would add that the Gas and Water Companies, had they no other motives in calling for the execution of these works, have a direct interest in any measure which will diminish the rate of insurance on coals.

And here it may be worth while to remark that, while some of our would-be statesmen are troubling themselves about the eventual danger to our country from the exportation of coal, there seems to be a much more immediate danger of our being shut out of some foreign markets by the opening up of other sources of supply. Thus the Rühr coal has lately been presented at Amsterdam at nearly the same price as the English coal; and, our correspondent, who informs us of this fact, states moreover, that the Rühr coal yields more gas, with greater ease, and with a greater illuminating power, than the English coal usually shipped to that market. We are inclined to believe that this is actually the case, from some observations we ourselves made when lately at the Cologne Gas-Works; and our coal shippers would do well to read this sign of the times.

The Parliamentary investigation into the quality of chain-cables has commenced, and a certain amount of the ordinary style of evidence on such occasions has been given; at present, however, the tendency of the proceedings does not seem likely to lead to much good, for they have been singularly devoid of any practical bearing, and they do not seem to point to any valid remedy for the present sad state of this important branch of our iron manufactures. In the mean time, the fearful accident, which lately took place on the Eastern Counties Railway, again forces the subject of our iron manufacture upon

public attention, in a very painful manner. It is said that the accident occurred through the fracture of a tire, and even that there was a defect in the manufacture of the tire itself: if either of these rumours be true, there must have been neglect or carelessness somewhere, and the consequences of the accident ought to be visited upon those who are responsible for its occurrence. But it seems to us, that it is possible that the tire broke in consequence of the change in the crystalline character of the iron, superinduced by the shocks the wheel must have been exposed to. At any rate, this part of the investigation ought to be followed up carefully, if it were only for the sake of settling the still mooted point as to whether or not such a change of state as we have alluded to really does occur. The interest of Railway Companies, and of the travelling public, is directly concerned in the solution of this obscure problem of manufacturing science.

In the last number of the *Saturday Review*, there is inserted one of the usual brilliant articles we are accustomed to meet with in that Journal, upon the subject of the execution of public works in India; but we suspect that our contemporary hardly perceives all the bearings of the subject. The article referred to, in fact, asserts that the system of a Government guarantee of a minimum rate of interest has already produced beneficial results in India; and that, although there may be logical objections to the system, the results hitherto have been to secure the execution of works of great public benefit, which otherwise would not have been attempted. This might have been both a true, and a politic, view of the question during the last few years; but it seems to us, that now India is likely to subside into a normal state, the application of abnormal laws ought to cease. On this account, then, it seems to us that it is objectionable to foster perhaps an unhealthy activity in the execution of public works by means of the guarantee of interest; but, at the same time, we also believe that it is far worse to leave the execution of such important operations as the Railway and Irrigation works, still so much required in India, to the Government. The common sense of this matter would be to allow private Enterprise to take its own course, and for the State simply to facilitate its early operations, and to protect its development. If the returns from Irrigation works, especially. be really so great as they are said to be, the Indian Government may be tolerably sure that no long time will elapse before the English superabundant capital will flow towards such undertakings. We expect there has been gross exaggeration in this matter; but, whether this be or be not true, experience has shown that the very worst executors of public works are Governments, and that next to them, in the order of incapacity, are guaranteed companies.

THE BATTLE OF THE JONES'S.

THE ordinary quietude of the borough of Dover is disturbed by a furious contest. The drums on the heights beat to arms; the clangour of trumpets from the castle announces the onset; and the whole of the inhabitants, civil and military, are summoned to witness the battle of the Jones's. Yes; the renowned firm of Brown, Jones, and Robinson, is threatened with dissolution. Brown looks on aghast; Robinson quakes in his shoes; for,

"When *Jones* meets *Jones*, then comes the tug of war."

The pen of Homer only could do justice to such a theme. The heroic muse disdains these degenerate days of gas and railways; and, deserted by her, we can but narrate the eventful history in very simple prose. Hoping that the Poet Laureate may be induced to attempt so high a flight in an epic poem, we now subjoin

"THE ARGUMENT." Be it known that in the town of Dover there lives—as there lives in every town of England and Wales—a certain man named Jones. In order that he might be known from the very many men of the same name, his parents had him christened Robert Hesketh. This same Jones was secretary of the gas company in the town of Dover, and gave so much satisfaction to his masters that, in the course of time, he became the sole manager of their affairs. Now, Jones was a shrewd man; and, having sometime afterwards taken counsel with a Scotchman, named Anderson, who dwelt in London, they managed matters so well that they got rich and prospered. They dealt fairly with their masters, paying them their rents in due time, and all things went well with them. But Jones's troubles came at length. The folks of the town grew envious of his smart house and good fortune. They thought he was making too much profit out of the gas, and they wanted to have it at a lower price. Now Jones, and the gas company before him, had made a bad bargain with the town council, to light the lamps of the town for less than the gas cost, and so he was forced to make those who burned gas in their houses and shops pay more for it than they would else have done. But they did not think about the loss to him on the street lamps, and only bore in mind the large sum they paid for lighting their houses; and they became wroth thereat. Not minding the ill-favoured look of the times, Jones persuaded his masters to ask the Parliament to grant them power to raise more money for carrying on their business. The pent-up storm then burst forth. Another gas company was talked about, and they brought from London another Jones, yclept Richard. Our hero, vastly enraged thereat, sent a challenge in hot haste to the interloper, who was not slow to accept it; and so the lists were opened, and the battle raged.

The foregoing Argument, for the construction of the proposed epic poem, will put our readers, as well as the Poet Laureate, in possession of the facts, and clear the ground for the combat. So far as the fight has yet advanced, the only weapons wielded by the combatants are words, but words so strong and trenchant, that they could scarcely be more cutting if the letter "s" were prefixed to them. The streets of Dover are filled with their hostile missives; and yet, as in the case of the two *Dromios*, the perplexed inhabitants are wondering who's who? They see displayed a thundering challenge, addressed, "To Mr. Jones," and signed with the same name; by the side of it is a still more fulminating reply, "To Mr. Jones," also signed Jones; ranged with that there is a third, more highly charged than the others, still from Jones to Jones; and, whilst we write, a fourth appears, exploding with the utmost vehemence, again addressed to Jones, but distinguished from the rest by the signature of "George Anderson." Should the good people of Dover be roused to join in the battle, it is to be apprehended that there will be a general indiscriminate *melée* of friends and foes. This confusion may supply many additional incidents for the Poet Laureate's "Battle of the Jones's" but, for the sake of truth and justice, it might be greatly to be lamented. The borough of Dover is not so unused to contests of other kinds as to be ignorant of the advantage of party colours, when not so necessary; and, unless differently coloured cockades be adopted by the Dover *Dromios*, there is great danger that, instead of the "Comedy of Errors," there may be enacted a tragedy of horrors.

There are some particulars of the *casus belli* which, though not sufficiently important to the world at large to be embodied in the epic poem, may yet be of interest to our readers. The Mr. Anderson mentioned in the Argument was an active promoter of the Cork Gas Consumers' Company; and is, in fact, joint manager, or contractor, with our hero, Mr. R. H. Jones, of the Dover Gas-Works. There is an old adage, that "what is sauce for the goose is sauce for the gander;" and, as Mr. Anderson has boasted that he cooked the United General Gas Company's goose with Consumers' Company sauce at Cork, the same kind of relish should retain its agreeable *piquant* savour at Dover; not that we would for an instant insinuate that he is the male feathered biped to whom it is applicable, nor that he is in danger of undergoing the like culinary process. Mr. Anderson, indeed, expressly declares that the two birds are altogether different, and of distinct species. The Dover bird, he says, is very much smaller and much less voracious than the goose he cooked at Cork, and that the same kind of sauce would not suit at all—it would be very unpalatable, in short. The other character in the argument—the second *Dromio*—is the engineer of the London Gas Company, who has filled up his leisure hours by visiting Dover, and acting as engineer of the Consumers' Company—that is to be. We are told, on authority, *de gustibus non est disputandum;* therefore, we ought not, perhaps, to question the taste which leads the engineer of an established company to ramble through the country as a knight-errant, to redress the grievances of complaining gas consumers. There is, we imagine, a sufficient number of free lances abroad, to protect oppressed damsels from the plundering and vile usage of ogre gas companies. While the adventurous champion of wronged innocence is thus engaged at a distance, the castle he is retained to defend may be attacked by those who have been exasperated by his hostile demonstrations, and the standard under which he fights may be rent and shattered by arrows from his own quiver. One of the adversaries our knight-errant is tilting with at Dover, if not of

the same kith and kin, has the blood of the Jones's in his veins, and has already dealt him some staggering blows, that may cause him to repent having undertaken the adventure; whilst the Scotch knight, or necromancer, threatens to transform him into a fish, and to chew him up forthwith. "I am somewhat anxious," says he, showing his teeth, "to catch fish of your kind when you stray from your own pond, to try a nibble in other waters. Let me have but such a chance, and I undertake to *shew* (*chew*?) you up a very small minnow." Not content with these dreadful designs on Jones individually, he further threatens dire deeds as retaliation on Jones's retainers, for allowing him thus "to nibble in other waters." It would, indeed, be a horrible termination to the battle of the Jones's for one of them to be swallowed up by a terrible Scotch giant, and we sincerely hope the inhabitants of Dover will be spared from witnessing so shocking a spectacle; though it would form a grand culminating catastrophe for the epic poem. The recent decision of the Court of Queen's Bench, in the case of the Longton Gas Company (Limited), will, however, do much towards damping the ardour of one of the belligerent parties, as the prospect of fines and imprisonment exercise a chilling influence on the most valiantly disposed; so that, after all, "The battle of the Jones's" may be a very harmless one of words.

Circular to Gas Companies.

THE judgment delivered by the Court of Queen's Bench, on Saturday last, in the case of the Queen, on the prosecution of the Stoke Fenton and Longton Gas Company, against the Longton Gas Company (Limited), their servants and workmen, carries the principle upon which the Sheffield case was settled much further, inasmuch as it is now decided that, although mains and service-pipes may have been lawfully laid for the supply of gas to public lamps, yet the breaking up of footpaths for laying service-pipes from the same mains for the supply of private consumers is an unlawful act, even if done with the permission of the public authorities, the owners and occupiers of the houses, the lord of the manor, and every other imaginable local authority, save that of Parliament. The importance of this judgment can scarcely be exaggerated. While it protects from unlawful competition the 158 gas companies of the United Kingdom which have obtained statutory powers, it exposes 870 companies which are without such powers, and 64 private owners of gas-works, to have their operations interfered with every time they may have occasion to open the ground for the repair of a main-pipe, or for laying a new main, or even a service-pipe, to a new consumer! Of course, those included in the two last categories who enjoy the good will of their neighbours are not likely to experience much inconvenience as long as that good will is accorded to them; but there are instances where their anomalous position may be used as an instrument of annoyance and vexation for the purpose of extorting concessions, more especially in respect of public lamps, which might otherwise have been successfully resisted. On the other hand, the cost of a special Act would form so heavy a charge upon the limited funds of numerous small gas companies as to render the sacrifice to local exigencies preferable to an application to Parliament for relief. It strikes us that the present state of the law bears harshly on companies thus situated, and that Courts of Quarter Sessions in England might be safely entrusted with limited powers over highways for the purpose of facilitating the supply of gas in places where statutory powers of supply have not been already granted. Eight hundred and seventy gas companies exist now simply by the unanimous forbearance of their neighbours, a state which one of them litigiously inclined can put at end to at any time.

A copy of the report of the Astronomer-Royal, dated the 11th inst., "On the instrumental equipments of the Exchequer Office of Weights and Measures, as regards the means of preventing fraud in the sale of gas to the public; and on the amendments which may be required to the existing legislation on that subject;" and also a copy of the letter to the Treasury of the Comptroller-General of the Exchequer, dated the 17th instant, in reference to that report, were laid on the table of the House of Commons on Wednesday last and ordered to be printed. These documents have reached us at so late an hour as to render their careful perusal impossible. We are, therefore, now unable to do more than to lay them *in extenso* before our readers. We fear the Circumlocution Office has got too firm a hold on the subject to warrant any hope of the speedy removal of the objections raised against the stamping of such gasholders as can be practically used in testing gas-meters. The matter must undergo immediate investigation before a select Parliamentary Committee; and the meter manufacturers have already taken the initiative by calling a general meeting of the trade, to be held at Radley's Hotel, New Bridge Street, Blackfriars, at two o'clock on Monday next. Gas companies, and the Meter Inspectors appointed under the Act, will probably imitate their example, or co-operate with them.

We insert elsewhere a communication from a "Provincial Inspector," who points out that, notwithstanding the care with which the standard measures have been adjusted, the public will only receive a cubic foot of gas when it is delivered to them at a temperature of 62°, and under a barometric pressure of 30 inches. This is quite true, as far as the abstract fact is concerned, but as this temperature and pressure are by common consent adopted as the mean temperature and pressure at the surface in this kingdom, they provide for as fair an average as can be obtained. It might perhaps have been more strictly correct to have adopted the mean temperature of the earth in which the mains are laid, as the gas is delivered to the consumer at that temperature, but we apprehend the mean temperature of the surface is near enough for all practical purposes. The doubt raised by our correspondent, as to whether the capacities of the testing gasholders will not vary according to the temperature and pressure existing at the time of the adjustment, is, we apprehend, unfounded. The cubical content of the standard foot measure will be the same, whether the temperature of the air or of the water be higher or lower than when the measure was originally adjusted. It will contain more than 62·321 lbs. of water at a temperature below 62°, and less at a greater temperature, but the *bulk* will be, under all circumstances, the same.

The lime-light has again been dragged into public notice by the exhibition of it at the Society of Arts on Wednesday last, when a paper on the subject, purporting to be from Mr. S. Squire Baxter, was read at the evening meeting. The light was displayed from the top of a standard about fifteen feet high, in a lantern consisting of five combined jets of coal gas and oxygen, playing upon five separate cylinders of lime. The light was, of course, very brilliant, but it was painfully glaring to the eyes at that elevation. The gas of the ordinary chandelier was partially turned off, so that the contrast between the intense white light and the comparatively dim yellow flames of the gas was greatly to the advantage of the former. The paper read was nothing more than a *verbatim* copy of Mr. Renton's report, which was published in a recent number of our JOURNAL, and neither Mr. Baxter nor any one connected with the company appeared to give further explanation when questions were asked. The members of the Society of Arts had some right to complain at having been assembled to listen to a report that was printed some months past; but the lack of novelty in the paper was compensated by the subsequent discussion, wherein Dr. Letheby, Dr. Bachhoffner, Mr. Hawes, and several others joined. Dr. Letheby denounced the proposed scheme of employing the lime-light for general illumination, as altogether impracticable. The proposed revivification of the deutoxide of manganese he declared to be an entire fallacy, and said that the only practicable means of obtaining oxygen gas in large quantities is by employing chlorate of potass, by which process the cost of the oxygen would be £9. 12s. per 1000 cubic feet. Dr. Letheby, in his very energetic opposition to lime-light illumination, asserted that it would not only be ten or twelve times more costly than coal gas, but would be dangerous to the eyes, for its intensity would paralyze the retina, which effect he had himself experienced. Dr. Bachhoffner spoke from his many years' experience of the light in the oxy-hydrogen microscope, and in the exhibition of dissolving views. The cost of the lime light, compared with an equivalent light by the ordinary combustion of coal gas, he stated to be in the proportion of 1s. 10½d. per hour for the former to 8½d. for coal gas. He said he had tons of the waste deutoxide of manganese at the Colosseum, and that the notion of its revivification was "all moonshine." The two Doctors, though they disagreed on several points, concurred cordially in condemning the lime-light scheme of illumination as impracticable. But they were not unopposed. Several speakers ventured to hope that, when a great demand for oxygen gas

arose, new and more economical sources of supply would spring up, from some quarter or other. One of them undertook to prophecy that a time would come, and before long, when a ready means of decomposing water would be discovered, and that we should feed our fires with water instead of with coal. Another saw an exhaustless supply of oxygen in vast strata of nitrate of potass in Peru; whilst another alluded to Mr. Michiels' ingenious process of absorbing oxygen from the atmosphere by baryta at one temperature, and evolving it again at a greater heat. Notwithstanding these suggestions of the probability of some future economical application of the lime-light, the only person who stood boldly forward to defend the scheme was Mr. W. Hawes; and even his defence was not grounded on its own merits, but on the demerits of its assailants. It was most unworthy, he said, of scientific gentlemen to state that a thing could not be done because they could not do it; and the same objections now urged against the lime-light might forty years ago have been advanced against illumination by coal gas. Mr. Hawes's gallantry in coming to the rescue of the lime-light did not, however, put a stop to depreciating questions that were unanswered, nor to suggested objections that were not replied to. If Dr. Letheby's estimate of the cost of producing oxygen gas be correct, it would altogether preclude the use of the lime-light for the purpose of illumination; and the lower estimate of Dr. Bachhoffner completely destroys its vaunted economy as compared with coal gas. The admirers of the lime-light illumination will, we fear, have to wait for its accomplishment till the advent of the predicted millennium, when our lamps will be trimmed and our fires lighted with water, and when we shall produce our beef and mutton from coal.

Whilst the discussion was proceeding, the gas of the chandelier was turned on full, and then the illuminating power of the two kinds of light nearly equalled each other. Shortly afterwards, the supply of oxygen became exhausted; and, as if symbolical of its fate, the lime-light was extinguished, leaving the coal gas to shine unrivalled, with much less intensity indeed, but much more agreeably.

Mr. William King, following in the footsteps of his honoured sire, in all that relates to gas lighting, has recently turned his attention to an examination of the extent to which the rays of gas lights are absorbed by the glasses used for protecting them, and has favoured us with a communication, in which the startling fact is announced, that plain glasses absorb upwards of 10 per cent. of the rays emitted by the combustion of the gas, and that this proportion is increased to 74 per cent. by the use of some description of coloured glasses. The question raised by this communication is a very interesting one, as it may afford an explanation of many of the complaints made with regard to deficiencies in illuminating power. Consumers must, in this respect, please themselves; but gas companies are not fairly chargeable with the freaks of their customers in matters of taste; and Mr. W. King deserves the thanks of the gas companies for having directed attention to the subject.

The protracted dispute between the metropolitan gas companies and the delegates is at length in a fair way of being settled. This satisfactory condition has been brought about, not by the mediation of the Home Secretary, but by the representatives of the companies and of the delegates at a conference held on the 15th inst., at which Sir John Shelley, Mr. Beal, and Mr. Wyatt, acted for the delegates, and Mr. Russell, Mr. Henry, and Mr. Baxter, for the companies. It appears from what took place at the conference, that the representatives of the delegates objected to produce a copy of their proposed bill, on the ground that it was drawn up on the assumption that some agreement with the companies would be arrived at, otherwise its provisions would have been more stringent. The representatives of the companies objected to negotiate in the dark, and at length the suspicious reserve was so far relaxed that a printed breviate of the bill was delivered to Mr. Baxter, the parliamentary agent for the companies. Its principles were then discussed, and most of the points on which the parties differed were arranged. The result of a long discussion was, that the two parliamentary agents, Mr. Baxter and Mr. Wyatt, were instructed to form a bill conjointly, founded on the principles to which the parties to the conference had agreed; those points that remained in dispute being left for consideration at a subsequent conference when the bill is prepared, and if not then arranged to be debated in the committee on the bill. It was further agreed, that the principle of districting, on which the unfortunate differences between the metropolitan parishes and the gas companies originated, is to be embodied in the preamble. The chief points left undecided at the conference are stated to have been price and illuminating power; but we understand that the latter is now, in fact, the only substantial question about which there is any difference, the delegates wanting to fix it at 12 *sperm* candles, and the companies at 12 *wax* candles. It will be remembered that this is the point to which the question was brought at the close of the last parliamentary inquiry by the sub-committee, who then endeavoured to effect a compromise; and, had the delegates continued so to limit their demands, very much ill-feeling, as well as much time and money, would have been spared. There is considerable difference of opinion among scientific men as to the proportionate illuminating power of wax and spermaceti, and in the present want of an undeviating standard of illuminating power, the prolongation of the quarrel on that account would be like fighting for an idea. The combats in Parliament are little less costly than warfare in the field; and the proceedings at the meeting of the Westminster District Board, reported in another column, show that there is great difficulty in finding the ways and means. This consideration may have rendered the delegates less pugnacious, and more ready to listen to reason; but, whatever may be the cause, we rejoice at the effect.

The Court of Exchequer has at length given its judgment in Mr. Hills' favour upon every point raised in the application for a new trial of the action brought by him against the London Gas Company for the infringement of his patent of 1849, for the purification of gas by oxide of iron prepared in a certain manner, and mixed with certain substances. The Court has thus deliberately affirmed the novelty and the legality of that patent, after a most patient and prolonged investigation. We confess we anticipated a different result, but we must bow to the verdict of such a tribunal, and, as Mr. Hills has thus fully established his rights, we feel it to be due to him to say that we have been misled by the strong opinions given upon the question by the writer of the "Chemistry of Gas-lighting" and that Mr. Hills at least is not one of those we recently characterized as possessors of illusory patents, which are worthless, except as a means of extortion in enabling their holders fraudulently to threaten actions of infringement. We unhesitatingly admit the completeness of his triumph, but as we write these lines without having seen the short-hand notes of the judgment, we must defer the consideration of its bearing upon oxides otherwise prepared and mixed with other substances, besides those used by Mr. Hills. Our impression, however, from hearing the judgment delivered, is that it covers the revivification of all oxides of iron from whatever source obtained.

Correspondence.

LOSS OF LIGHT BY GLASS SHADES.

Sir,—Having recently tried some experiments, for the purpose of ascertaining the amount of light lost by the use of various descriptions of glass shades, I thought that the results obtained might not prove uninteresting to some of your readers, more especially as it is a subject of practical importance, and does not seem to have attracted the notice which it deserves.

The following table exhibits the amount of light lost by the use of the various shades therein enumerated:—

Description of shade.	Loss of light.
Clear glass	10·57 per cent.
Ground Glass, (entire surface ground)	23·48 „
Smooth opal	52.83 „
Ground opal	55·85 „
Ground opal, ornamented with painted figures the figures intervening between the burner and the photometer screen	73·98 „

As the large amount of light lost by the use of a clear glass shade excited some surprise, a sheet of common window glass was placed between the burner and the photometer screen, when it was found that 9·34 per cent of the light was intercepted, thus confirming the result obtained by the employment of a shade of clear glass.

I may state that the shades were selected from a large number, and great pains were taken to obtain an average specimen of each kind.

William King.

Liverpool, Feb. 24, 1860.

THE ASTRONOMER-ROYAL'S CUBIC FOOT.

Sir,—In the observations in the last number of your Journal, on the shortcomings of the Circumlocution Office in their attempts to comply with the provisions of Lord Redesdale's Act, you have

omitted to notice one point that seems to me very essential. You assume the bottle deposited by the Astronomer-Royal at the Exchequer Office to be a standard measure of a cubic foot of *gas;* but, in truth, it is no such thing. It is only a measure of a cubic foot of *water*, at a given pressure and temperature; and, as it now stands, will be worse than useless in measuring a cubic foot of gas. Suppose, for instance, that a meter-maker were to use the Astronomer-Royal's bottle for the purpose of adjusting the scale of a gasholder, when the pressure indicated by the barometer was 30°, and the temperature of the gas 62°; and that another meter-maker were to use the same bottle for adjusting a gasholder, when the pressure was, say, 28°, and the temperature 32°; what would be the consequence? Why the two testing instruments, *accurately adjusted by the same "standard cubic foot,"* would hold such different quantities, when brought to the same pressure and temperature, that a meter tested by one of them might be passed as perfectly correct, whilst, if tested by the other, it would be at least 12 per cent wrong!

You say that you have little doubt that the Astronomer-Royal's bottle full of water weighs the prescribed quantity to the fraction of a grain; but this minute attention to accuracy in one particular, whilst a source of error amounting to at least 12 per cent. is overlooked, is straining out a gnat and swallowing a camel with a vengeance!

It may be said, in vindication, that the Act mentions a cubic foot of water, not of gas; and so the Circumlocution Office may throw the blame on Parliament. But it was not necessary to bring the Astronomer-Royal from the heights of Greenwich into the murky atmosphere of London to make a vessel that would hold a given weight of water; for a common tinker might have done that. Whilst he was among us, he would have done good service had he furnished us with a sliding scale of the adjustments requisite to adapt his cubic foot of water to measure a cubic foot of gas at different temperatures and pressures, for until that be done it is only a delusion and a snare. The "standard measure" at present provided is more variable than a weathercock; for the quantity of gas measured by it would be affected by every change of temperature, as well as by every change of wind.

A PROVINCIAL INSPECTOR.

London, February 16, 1860.

EFFECT OF LIGHTNING ON A GAS-PIPE.

SIR,—Since reading, in the last number of the JOURNAL, an account of the melting of a tin gas-pipe by lightning in New South Wales, I have felt desirous to record a somewhat similar occurrence, which has come under my observation.

During a rather severe thunder-storm in the summer of 1858, some trifling damage was done by the lightning in the kitchen apartment of a house here. The gas, which was burning at the time, suddenly went out, and very soon afterwards a strong smell of gas was perceived. The tin pipe conveying the gas was not concealed, but was fixed exposed on the wall of the apartment, and it was soon discovered that this pipe was severed near the spot where a polished iron ornament had been hanging. I afterwards examined the fracture, and the edges presented all that irregular and slightly blackened appearance, which a piece of that description of pipe presents after being held in a flame until melted.

If you think the above may convey any information, or suggestion to the readers of the JOURNAL, you will oblige by giving it insertion.

WILLIAM MACKENZIE.

Gas-Works, Cupar, Fife, February 22, 1860.

BALANCE-SHEET OF A VILLAGE GAS-WORK.

SIR,—The model "Balance-Sheet of a Village Gas-Work" looks very well at first sight, but, if more closely examined, it exhibits a very different aspect.

Taking the share and borrowed capital at £1850, I apprehend that at least £1200 will be invested in buildings, apparatus, mains, and service-pipes, and £200 more in meters, upon which no allowance is made for depreciation, neither is anything set down for wear and tear of retorts, &c. On the other hand, £20. 10s. 10d. is charged for service-pipes and meters, which ought to be charged to capital; and, if the account is corrected in these respects, I apprehend it would stand thus—

Balance, as per statement				£105	1 8
Service-pipes and meters				20	10 10
				£125	12 6
Deduct—					
5 per cent. interest on £250 borrowed,	£12	10	0		
Wear and tear of retorts, &c., say ..	15	0	0		
1½ per cent. on £1200, for depreciation on works and mains	18	0	0		
7½ per cent. on £200, for depreciation on meters	15	0	0		
				60	10 0
Leaving				£65	2 6

available for dividend, instead of £105. 1s. 8d., or a fraction over 4 per cent. on the share capital.

A COUNTRY MANAGER.

GAS LIGHTING IN SOUTH AMERICA.

SIR,—By the JOURNAL which came to hand last mail, I see you are duly chronicling the health and prosperity of sundry metropolitan gas companies. Upon reading the reports, it struck me you might like to know how the climate on the shores of the South Pacific agrees with gas, and, as I have just concluded my financial year, I am able to tell you what sort of dividends we pay here.

This establishment was erected in 1856, and gas was first supplied on the 18th of September of that year—the anniversary of Chilian independence. The cost of the works, up to the present time, has been 200,000 dollars; they are situated within 200 yards of the sea-shore, on a piece of land which formerly was a bay used by the fishermen—the cliff rising immediately behind the retort-house. The works are now completed for the production of 180,000 cubic feet, Spanish, per day. In the original plan, it was proposed to adopt the Phœnix mode of setting seven retorts to one fire, but, owing to a serious fault in the construction of the flues, the retorts heated very irregularly, and the wear and tear of the furnaces were very great. Since I took charge of the works, I have altered the setting to five retorts to one fire (three and two), with descending flues. I obtain much better results, and much greater economy in fuel. I have just commenced substituting clay retorts for iron ones. So far the change is a decided improvement, but, as I employ none but native stokers, I find it requires more attention on my part to secure the proper working of the clays. I use the following quantities and description of coals:—Native Chilian, 63 per cent.; Newcastle, 22 to 23; Boghead cannel, 16 to 17. During the winter months—say in June, July, and part of August—I increase the quantity of Boghead to 20 per cent. The average illuminating power of the gas for the past year has been—in summer, 17¼ candles, and, in winter, 20 candles. The native coal yields about 8000 feet English of gas per ton, of very fair quality; but the coke is small, and very soft and light—in fact, 2000 lbs. of coal yield only 440 lbs. of coke that will not pass through a sieve with a ¾-inch mesh. I am, therefore, obliged to use English coal, in order to obtain sufficient coke for my furnaces. My purification is a most expensive item in the cost of manufacture. We use lime, or, as it is called here, "*Cal-de-Concha.*" It is prepared from shells, of which there are immense deposits in various parts on the coast. These shell-beds are quite recent, and are due to the gradual rising which is taking place along the whole extent of coast from Paita, in Peru, to the Straits of Magellan. The shell-lime is very beautiful in appearance, but weak; it costs me here 6s. English for 175 lbs., or one *fanega;* a fanega of lime will purify, on the average, 6500 feet of gas. I have made several excursions into the interior of the country, in search of limestone, but, hitherto, without success.

During the past year, I have delivered 21,500,000 feet of gas, including that consumed by the public lamps. The charge to private consumers is 6 dollars per 1000 feet Spanish. The lamps are charged 7 dollars each per month, and are not lighted during the moon. The net receipts for gas during the past year have been 104,760 dollars, and the average profits for the two years have been equal to a dividend of 15¾ per cent. per annum on the actual capital, in addition to the sum of 21,640 dollars, which has been expended in completing the works, and not charged to capital. These profits appear large, but they are not adequate to the risk in such countries as these, where there is so little permanent security. For the first eight months of this year, the country was in a state of revolution; and, for many weeks, I did not know from one hour to another when I might have an attack from the mobs. Such was the feverish state of excitement at one time, that, if one of the public lamps happened to go out, or one or two burn unsteady, I had a soldier riding down to the works, and thundering at my door at all hours of the night. To give you an idea of my position, I may mention a circumstance which occurred soon after the revolution broke out. In consequence of some defect in laying the pipes from the meter to the gasholder, I was constantly troubled with a stoppage, from the pipe becoming water-logged. I therefore determined to break the connexion, and lower the pipe so that it might drain into the syphon at the gasholder. Owing to an accident, I did not get the work complete as soon as I expected, and, as both inlet and outlet had to be lowered, I had to cut both pipes; and, in consequence of the air getting in, some twenty lamps on the high ground would not light for about twenty minutes after the usual time. This was reported to the "*Intendente,*" and, as it happens that my managing director belongs to what is called the Liberal party, and is opposed to the present Government, the defect in the lamps was construed into a revolutionary signal, and orders were given to arrest both the director and myself. I, however, had started on horseback to the point where the defect had occurred, and was in the act of lighting some of the "*revolutionary lamps,*" at the time a *posse* of police made their appearance, to watch my movements. On another occasion, I had notice that an attack on the works was contemplated, and the mob would try to put out the gas by destroying the gasholder. I had a guard of soldiers over each valve, and in the governor-room. I assure you, during the period I now refer to, it was "*gas management*" under some difficulties. Within the last few weeks, we have had a new attack made upon us, in the shape of a "new company." It appears that some of the Glasgow papers, detailing Mr. Flintoff's

exploits in that city, have reached Valparaiso, and the Government party, who are very bitter against this company and the municipality, who hold a third of our capital, have seized the opportunity to raise an outcry. By their manifesto, the good folks here are promised gas at 3 dollars per 1000 feet; meters, the same as approved of by "*the Queen of England;*" gas of the quality as proposed by "*Sieur Flintof, en la Ciudad de Glasgow.*" Our evil deeds, and the good works of the new "*compania,*" are set forth in a quarto pamphlet of eighteen pages, in double columns. But the worst feature in this opposition is the part which the Government is taking in the matter. It is clearly a political dodge, to secure votes for the "*presidential election;*" and I should not be at all surprised to hear that members of the Government had subscribed a large portion of the capital.

H. G.

Valparaiso, Dec. 14, 1859.

Register of New Patents.

1814.—Charles Claude Raymond Goudenove and Adolphe Ferret, both of 60, Rue Neuve, St. Augustin, Paris, merchants, for "*An improvement in gas-burners.*" A communication. Provisional protection only obtained. Dated Aug. 6, 1859.

This invention has for its object improvements in gas-burners. In constructing gas-burners according to this invention, an enlargement or box is formed below the orifice through which the gas escapes. This box is capable of being unscrewed to admit of a porous disc being placed therein, and through this porous disc the gas passes. This disc possesses the property of purifying the gas and regulating the pressure. The ingredients of which it is composed are lime, sand, soda, and water, mixed together under pressure, moulded, and indurated by heat. The disc is placed in the burner, as above described, and hermetically fixed by means of a cement, so that the gas is forced to pass through it.

1828.—John Henry Johnson, of 47, Lincoln's Inn Fields, and Glasgow for "*An improved signal-light, and in the apparatus employed in the production thereof.*" A communication. Patent dated Aug. 8, 1859.

This invention relates to the production of a new signal-light capable of being used at sea as a signal of distress, and applicable in all cases where a powerful signal-light is required—such as on railways, or in lighthouses, or generally on land, and everywhere where a signal, order, or communication might be required.

In carrying out this invention, it is proposed to apply the spontaneous combustible properties of phosphuretted hydrogen to the production of signal-lights; for which purpose any phosphuret is applicable, but more particularly the phosphuret of calcium and the phosphuret of barium. The phosphuret is enclosed in a hermetically-sealed vessel or chamber, so constructed as to admit of the introduction or entrance of water therein when the gas is required to be generated. When intended to be used at sea, or on the water, this vessel is made buoyant, by being attached to a float, or by having the requisite quantity of air contained therein; and, according to one modification, is provided with a tightly stoppered tube at the top and at the bottom, the bottom one serving for the admission of water when the vessel is floated on the surface, while the other allows the gas generated by the admixture of the water with the phosphuret to escape and become inflamed by contact with the air. On casting the apparatus into the water, the stoppers of the tubes are perforated by the withdrawal through them of a wire attached to a cord or otherwise, when the generation of gas will immediately commence by reason of the entrance of the water into and among the phosphuret.

When required for use on land, two vessels or a divided vessel may be used, the upper portion containing water and the lower one the phosphuret; a pipe and stop-cock connecting the two, so that the water may be readily admitted to the lower vessel at pleasure, by turning the stop-cock. It is obvious that various forms of apparatus may be employed, the sole object to be attained being the admission of water to the phosphuret and the free escape of the phosphuretted hydrogen generated thereby.

This peculiar light is admirably adapted for use at sea in stormy weather, as it is not affected or extinguished either by wind or moisture. The immense lighting power of this apparatus, which casts its brilliancy and reflection vertically, as well as horizontally, makes this light particularly useful on lines of railway or roads where curves are frequent. In such cases the reflection may be seen at a distance of several miles from the place where it is working.

In adapting this apparatus for use as a submarine light or lamp, for visiting the screw, keel, or other part of a vessel, or for conducting submarine operations or searches, as in the case of wrecks, or laying submarine foundations, the nozzle of the tube or burner is surrounded by a central pipe, which extends slightly above the end of the burner. This central pipe is connected by a branch with a flexible pipe leading to an air-pump at the surface. The object of this addition is to supply the atmospheric air, which is indispensable for combustion under water, by forcing air down the flexible pipe, which air is brought in contact with the light by means of the central tube surrounding the burner.

The drawings attached to the specification exhibit various modifications of the apparatus employed, in order to adapt it for the various purposes to which the invention is applicable.

The claim is for—

1. The general construction and arrangement of apparatus for producing signal-lights, as hereinbefore described.

2. The application and use of phosphuretted hydrogen gas for the production of signal-lights at sea or on land, as hereinbefore described.

1835.—Thomas Dunn, of Manchester, engineer, for "*Improvement in machinery and apparatus for elevating and regulating the level and flow of liquids, part of which is applicable for propelling vessels.*" Patent dated Aug. 9, 1859.

These improvements in machinery and apparatus for elevating fluids consist in certain improved modes of constructing endless chain-pumps. A chain of balls or cylinders, made of wood or other material, is put in motion, either in a vertical or diagonal position. One side of the chain works within the pipe or tube through which the fluid is raised, while the other side descends free.

The improvements in the machinery and apparatus for regulating the level and flow of liquids are as follows:—When water or other fluid has been elevated into a cistern, by means of the improved machinery above-described, or otherwise, it is kept at the same level by a float, fitting loosely on the spindle of a valve. This last part of the invention is also applicable to letting off water from steam-pipes. In this case the valve is placed in the off-pipe, and the float is contained in a vessel in which the water accumulates. Consequently, when there is enough water to lift the float, the valve is opened to allow the water to run off. The level and flow of fluids can also be regulated by a graduated weighted lever, connected to a valve. When the pressure of the fluid is sufficiently great to raise the valve, the fluid will flow through the valve, until the pressure is reduced to the point fixed upon.

Another part of the invention of improvemements in machinery or apparatus for elevating fluids, consists in making the pump-barrel to move to and fro on the feed and discharge-pipes, which are furnished with feed and delivering-valves. By this means a double-acting pump is obtained with a single pump-barrel.

1854.—John James Speed, the younger, of the city of Detroit, U.S.A., telegraph engineer, for "*Improvements in the manufacture of pipes, tubes, and hollow cylinders.*" Patent dated Aug. 10, 1859.

A tube is first formed by bending round sheet metal and overlapping and uniting the edges by rivets or otherwise. This sheet-metal is galvanized on one or both sides, or may be coated with any desired metal or metallic allay. Round the sheet-metal tube, spiral wire, or strips or bands of metal, are wound, and the whole are united by placing the partially finished pipe or cylinder in a bath of molten metal, and employing a flux to cause adhesion. The pipe is made to revolve in the bath until a sufficient coating has been deposited or become fixed to it, and the operation of coating is repeated as often as may be found necessary to secure the thickness desired. For some purposes more than one spiral layer is wound; or, according to the purposes for which the finished article is intended, various thicknesses of sheet-metal and wire of different guages are used.

For water-pipes, the interior is coated with zinc, or that metal is used as the core; and for gas, the interior is coated with lead, or sheet lead is used for the core.

1859.—David Hulett, of 55 and 56, High Holborn, London, gas engineer, and George Prudden, of Shefford, Beds, gas engineer, for "*Improvements in apparatus for the manufacture and distribution of gas, and in apparatus applicable for internal or external illumination.*" Patent dated Aug. 11, 1859.

These improvements relate to the general arrangement of the apparatus for manufacturing gas, by which economy of space is obtained, and greater facility is afforded for cleansing, repairing, and adjusting the same. They also relate to an improved valve, with the outlet encircling the inlet, or *vice versâ*. Also a method of supporting the chimnies of gas-burners, and the formation of illumination-devices with drops and spangles.

1889.—William Gossage, of Widnes, in the co. of Lancaster, chemist, for "*Improvements in the treatment of certain offensive liquids, and of noxious gases liberated from such liquids.*" Provisional protection only obtained. Dated Aug. 16, 1859.

The offensive liquids, for the treatment of which these improvements are applicable, are such liquids as contain sulphuretted or phosphuretted hydrogen, or contain such compounds of sulphur or phosphorus as are capable of liberating sulphuretted hydrogen or phosphuretted hydrogen; also, such liquids as contain compounds of hydrogen with other substances, which compounds are capable of being decomposed by oxidation of the hydrogen, forming one of their constituents.

The improvements in the treatment of such liquids, also of the noxious gases liberated from such liquids, are effected by the use of certain oxides of iron or of manganese, these oxides being such as are capable of giving up oxygen to the compounds of hydrogen hereinbefore mentioned; the oxygen so given up being the agent by which the oxidation of hydrogen is effected in the treatment of the liquids and gases hereinbefore mentioned.

1901.—Hyam Jacob Hyams, of Holywell Street, Westminster, gas-meter maker, for "*Improvements in the construction of wet gas-meters.*" Patent dated Aug. 18, 1859.

This specification, with several engravings illustrating it, will appear in the next number.

1913.—David Grant, of Edinburgh, N.B., gas-meter manufacturer, for "*Improvements in wet gas-meters.*" Provisional protection only obtained. Dated Aug. 22, 1859.

This invention relates to the arrangement and construction of what are technically known as wet gas-meters of the compensating kind, in which the water is maintained at a uniform level, by means of self-acting mechanism. Under one modification of this uniformity the fluid level is maintained by means of a mechanical arrangement in connexion with the spindle of the measuring-cylinder. This consists of a wheel, or radial arms, or other equivalent therefor, having affixed thereto small cups or buckets, or pieces of fibrous or other material suitable for absorbing or taking up a small quantity of fluid from the well or reservoir of the meter. This bucket-wheel, or series of radial arms, or other equivalent, are fitted to a stud projecting from the face of the water-line reservoir, which has free communication with the measuring-chamber of the meter. The buckets, or fluid-lifting media, are attached to short arms projecting inwardly from the face of the wheel or radial arms, and, by the rotation of the wheel,

they dip into the well, or supply-reservoir, below the water line chamber. As the buckets, or lifting media, pass round, a small quantity of water is taken up which drops off or flows into the water-line reservoir, so as to keep the fluid in the measuring-chamber at the proper level. Should the buckets, or lifting media, raise too much water, the surplus quantity flows back into the supply-reservoir down a waste-pipe, fitted in the water-line chamber. Motion is communicated to the wheel, or radial arms, from the measuring-cylinder, the spindle of which has fast to it a pinion, which is in gear with a wheel that is carried upon a stud projecting from the exterior of the measuring-chamber. The extremity of this stud has fast to it the pinion which gives motion to a wheel on the stud of the bucket-wheel, or the radial arms.

To prevent the meter from being tampered with, for the purpose of causing it to register a less quantity of gas than is actually consumed, the water supply tube is bent like an inverted syphon. The shorter leg of the syphon enters the upper part of the interior of the meter, so that, if the water is abstracted, the measured gas alone flows through. The well or supply-reservoir is furnished with a waste or overflow-pipe, to prevent the water from rising beyond the predetermined level within; this pipe is closed by means of a milled edge screw, or plug. To prevent, also, the tilting of the meter, for the purpose of allowing unmeasured gas to flow through, a float-valve is fitted at the back of the meter, so that, if it be placed out of the level, the valve closes the outlet aperture. With these improvements, the arrangement of the compensating wet meter is greatly simplified at the same time that its action is rendered far more satisfactory and efficient.

1922.—Oliver Maggs, of Bourton, in the co. of Dorset, for "*Improvements in taps, cocks, or valves.*" Patent dated Aug. 22, 1859.

These improvements consist in using a shell or barrel, of any convenient size, with a recess or globular chamber in or near the centre, formed like two cups, with a ring or flange round each of them, for the convenience of screwing together and forming the globular chamber. A plug or ball, with a spindle for turning the same, having a passage of required size through the centre, corresponding with the passage through the barrel, is placed between the two metal rings, having a recess or bearing for the ball-spindle to revolve in freely. A disc or discs of indiarubber, or other suitable material, are placed on one or both sides of the said rings, and their edges are placed between the flanges of the cups, and the whole screwed together. Thus the plug or ball is enclosed in the recess or globular chamber; the indiarubber discs, also having a hole or passage corresponding in size with the passage through the barrel and ball. By turning the spindle and ball partly round, the blank side of the ball is brought opposite the hole or passage in the indiarubber; and the elasticity, as well as any pressure against the indiarubber, effectually closes the aperture, and renders it free from leakage, either of air, water, gas, or other fluid—the plug or ball forming a resisting seating for the indiarubber under any pressure, and the indiarubber forming a flexible seating for the ball free from wear or leakage.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

114.—Nathaniel Green, of 47, Parliament Street, Westminster, C.E., for "*Improved pressure and vacuum gauges for steam, water, gas, or other fluids.*" Jan. 17, 1860.

246.—George Smith, of Glasgow, N.B., ironfounder, for "*Improvements in monuments, fountains, lamps, letter-boxes, and urinals, and such like ornamental and public erections in cast-iron.*" Jan. 31, 1860.

252.—Thomas Culpin, of 24, Dowgate Hill, London, engineer, for "*Improvements in water-closets, and all sanitary vessels that require frequent flushing.*" Jan. 31, 1860.

256.—Ferdinand Jossa, of Sunderland, chemist, for "*Improvements in the manufacture of sal-ammoniac from small and refuse coals, and from the gas generated in the manufacture of coke.*" Jan. 31, 1860.

301.—Charles Theodule Launay and Auguste Marie Alexandre Dominé de Vernez, both of Paris, gentlemen, for "*An improved valve or cock for regulating or stopping the passage of gas, steam, water or other fluids.*" Feb. 4, 1860.

302.—Charles Theodule Launay and Auguste Marie Alexandre Dominé de Vernez, both of Paris, gentlemen, for "*An improved apparatus for carburating hydrogen or other gas for illuminating purposes.*" Feb. 4, 1860.

401.—William Hunter, of 30, Sussex Place, Kensington, London, for "*Improvements in apparatus for measuring and regulating the flow of gas, as applied to compensating gas-meters.*" Feb. 14, 1860.

419.—Josiah George Jennings, of Holland Street, Blackfriars, London, sanitary engineer, for "*Improvements in water-closets, urinals, and lavatories.*" Feb. 15, 1860.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

2329.—Thomas Barnabas Daft, of Tottenham, Middlesex, C.E., for "*Improvements in flexible valves.*" Oct. 12, 1859.

2800.—Rudolph Heilman, of Manchester, manufacturing chemist, for "*The preparation of a new colour, called 'Azaline,' and its application to dyeing and printing.*" Dec. 10, 1859.

49.—James Bowyer D'Arcey Boulton, of Usk, Monmouth, C.E., for "*Improvements in slide valves.*" Jan. 7, 1860.

246.—George Smith, of Glasgow, N.B., ironfounder, for "*Improvements in monuments, fountains, lamps, letter-boxes, urinals, and such like ornamental and public erections in cast-iron.*" Jan. 31, 1860.

Legal Intelligence.

COURT OF QUEEN'S BENCH.

SATURDAY, FEB. 25.

(*Sittings in Banco, before Lord Chief Justice* COCKBURN *and Justice* WIGHTMAN.)

THE QUEEN (ON THE PROSECUTION OF THE STOKE FENTON AND LONGTON GAS COMPANY) *v.* THE LONGTON GAS COMPANY (LIMITED) AND OTHERS.*

This was an indictment for a nuisance to the footpaths and streets in the town of Longton, in the county of Stafford. The first count alleged that the defendants, on the 9th day of August, 1858, in a certain common and public footway, called High Street, Longton, situate in the parish of Stoke-upon-Trent, in the county of Stafford, being the Queen's common highway, used for all the liege subjects of our Lady the Queen to go, return, pass, and repass, on foot, in and along the same, at their free will and pleasure, unlawfully and injuriously did dig up the pavements of the said footway, and did put and place bricks, earth, and rubbish, in and upon the said footway, and dug and made therein certain holes and trenches, of the respective widths of two feet, and continued the same trenches open, to wit, for twelve hours, and laid and placed down iron pipes in the same, whereby the Queen's common highway aforesaid, then, and for and during all the time aforesaid, was obstructed and encumbered, to the great damage and common nuisance of all Her Majesty's liege subjects. The second count charged that the defendants, on the 16th of August, 1858, in the same manner and for the same period, obstructed and encumbered a certain street, called Russell Street, Longton, by digging up the said street, and placing earth and rubbish in and upon the same, and making and continuing divers holes and trenches therein of the width, and for the time above-mentioned. The third count charged that the defendants, on the 20th of August, 1858, in the same manner and for the same period, obstructed and encumbered a public and common highway, called Sutherland Road, by digging up the pavement and roadway of the said highway, and placing thereon bricks, earth, and rubbish, and making therein divers holes and trenches of the width and for the time above mentioned. The fourth count charged that the defendants, on the 24th of August, 1858, obstructed and encumbered a certain highway, called Middle Cross Street, in the same manner and for the same period, as alleged in the third count. The fifth count charged that the defendants, on the 23rd of September, 1858, obstructed and encumbered a certain public footway, called King Street, Longton, by digging up the pavement of the same, and placing bricks, earth, and rubbish thereon, and making and continuing therein divers holes and trenches of the width and for the same period of twelve hours as before mentioned. The defendant, William Brown died before plea; the other defendants pleaded "Not guilty." The case came on to be tried before the honourable Mr. Justice Crompton, at the last Stafford assizes, whon it was arranged that a verdict of "Not guilty" should be entered as respected the defendants, William Webberley, Thomas Cope, James Baech, and William Bateman; and a verdict of "Guilty" as against all the other defendants, subject to the opinion of the court upon the following

CASE.

The town of Longton is one of the towns situated within the Staffordshire Potteries district. It contains about 15,000 inhabitants, and is two miles distant from the town of Stoke-upon-Trent, where the gas-works of the Stoke Fenton and Longton Gas Company, hereinafter mentioned, are situate. Before the passing of the Act, 2 Vic., cap. 44, hereinafter referred to, the streets, lanes, roads, and public passages, and places within or around the said town, were not lighted, nor were there any public lamps within or around the said town.

By the said Act, entitled "An Act for establishing an effective police in places within or adjoining to the district called the Staffordshire Potteries, and for improving and cleansing the same, and better lighting parts thereof," the said town of Longton, and the several other towns, townships, or places mentioned in the said Act, were, for the purposes of the Act, divided into four separate districts, called respectively, the Longton district, the Fenton district, the Stoke district, and the Trentham district—the said Longton district being formed of the said town of Longton, which comprises the township of Longton and the township of Lane-End, mentioned in the said Act—and each of the said districts is placed under the government and directions of a separate and distinct body of commissioners, called the Commissioners of Police of the respective districts. Section 68 of the Act, empowers the commissioners of the Longton district, of the Fenton district, and of Stoke district respectively, to light, or cause to be lighted, the streets, roads, lanes, and other public passages and places within their respective districts; and to set up, or affix, or cause to be set up, or affixed, such lamps, irons, and lamp-posts, or other posts, and all such other materials and things, as they may judge necessary to be set up in such streets, &c.; and upon or against the walls, or any other part of any house, or in such other manner as they shall think proper, doing no damage or injury to any house, &c.; and also to cause lamps to be affixed, and put up on such lamp-irons or lamp-posts, as they shall think necessary for lighting all or any of the streets, lanes, roads, and other public passages and places within their said respective districts, and to cause the same to be lighted with gas, oil, or otherwise, at such times and seasons as they shall think necessary; and to contract and agree with any company of proprietors, or other persons, to light the said streets, &c., with gas, oil, or otherwise, in such manner and upon such terms, conditions, and agreements, as such commissioners respectively from time to time shall think proper; and such company or persons are authorized, to execute any of the powers by this Act given to such commissioners for the purposes of such lighting as shall be expressed in any such contract. Provided always, that it shall not be lawful to carry, lay, place, or fix, any lamp-iron or lamp, or any pipe and other matter or thing for lighting into, or through, or against, or on any dwelling-house, or private building, &c.; or so to continue the same, without the consent in writing of the owner or occupier thereof.

And, by section 69, in case it shall be determined to light all or any of the said streets, lanes, roads, and other public passages and places, the commissioners or persons with whom they contract or agree, as aforesaid, may direct the digging and breaking up the soil or pavement of any of the footways or carriage-ways of any of the streets, lanes, roads, or other public passages and places within their said respective districts, in order and for the purpose of sinking, constructing, laying, and fixing pipes, stop-cocks,

* We propose, in a few days, to publish, in a separate form, the arguments *in extenso* in this important case, with the judgment of the court.

plugs, branches, and all other works and apparatus necessary for such lighting with gas; and from time to time to direct the same to be taken up, and repaired, as may be needful and expedient, making good and restoring to its former state and condition all such soil or pavement so broken up.

By section 78, the commissioners are authorized from time to time to contract and agree with any body politic or corporate, or company of proprietors, or any person whomsoever, for lighting the said streets, lanes, roads, and other public passages and places within their respective districts, or any of them, or for furnishing, providing, and erecting or placing lamp-posts, lamp-pipes, and other matters and things, and for doing any works necessary for carrying into execution the purposes of the said Act, so far as respects the lighting such streets, lanes, roads, and other public passages and places, or any of them.

The said Act, by section 83, further provides for defraying, from time to time, the costs and expenses of lighting the said Longton, Fenton, and Stoke districts respectively, by a just and equal pound-rate or assessment, not exceeding 8d. in the pound in any one year, to be made and levied by the said commissioners, under the name of "the public lighting-rate," upon all persons inhabiting, using, or occupying any house, shops, &c., within their said respective districts.

And by section 100 it is provided that all the moneys raised under the name of the public lighting-rate shall be vested in the commissioners of the particular district, and be applied and disposed of for defraying the costs, charges, and expenses in, for, and about the public lighting of the several streets, lanes, roads, and other public passages and places in the district within which the same shall be raised.

The Act contains provision respecting the removal of nuisances and obstructions. Sec. 47 empowers the commissioners to cause all encroachments and obstructions on the footways and carriageways in the streets, &c., to be removed, and for such purpose to give 21 days' notice to occupiers and tenants to remove projections. Sec 51 empowers them to make sewers, tunnels, gutters, drains, &c., in the streets, &c. for draining and cleansing the districts. Sec. 66 imposes a penalty on (*inter alia*) any person who wilfully impedes or obstructs the free passage of any person upon or along, or in any footpath, footway or carriageway, or the free passage of any horse, beast, or carriage along any carriageway, or commits or causes any other nuisances or annoyance whatever, and it empowers any constable or other peace-officer, or any commissioner, or any officer appointed under the Act to take away and remove any of the thereinbefore mentioned obstructions, nuisances, or annoyances, in case the party occasioning the same shall not forthwith remove the same within a reasonable time after being required so to do by any person whomsoever.

Soon after the passing of the said Act, a company, called the "Stoke Fenton and Longton Gas Company," was established by a deed of settlement or co-partnership, for the purpose of supplying with gas the said towns of Stoke-upon-Trent, Fenton, and Longton, and the places adjacent; and the said company thereupon erected gas-works, and laid down their mains and pipes for public and private lighting through the streets and footways within the town of Longton and the places adjacent; and since the said company was established, and until the 1st day of September, 1858, the commissioners of the said Longton districts have from time to time (except during the winter of 1849, when the public lamps in Longton were lighted with naphtha), duly contracted with the said company under the powers of their Act, for the lighting of the streets, roads, lanes, and other public passages and places within their said districts, including the said town of Longton, and the said company have during all the said time (except as aforesaid) continued to light the said streets, roads, lanes, and other public passages, and places, and also private houses and buildings, and the only authority which they had for breaking up the said streets and footways, and laying down the mains and pipes for the public or private lighting was the permission given to them by the London commissioners under the said Act.

On the 14th of June, 1858, an Act was passed (21 Vic., cap. 11), by which the persons forming the said Stoke Fenton and Longton Gas Company are incorporated by the name of the "Stoke Fenton and Longton Gas Company," for the purpose of making and supplying gas within the limits of the said Act of Incorporation, which limits include the whole of the said Stoke Fenton and Longton districts respectively.

This Act was unsuccessfully opposed in its progress through Parliament by the said commissioners of the Longton district.

On the 5th of June, 1858, while the last-mentioned Act was passing through Parliament, and before it received the royal assent (and before any money was expended in any works in Longton under its provisions) a company was established, under the Joint-Stock Companies' Act, 1856, by the name of the "Longton Gas Company (Limited)" (of which several of the said commissioners were and are shareholders), for the manufacture and supply of gas within the Longton district; and on or about the 1st day of August, 1858, the said company began to erect their gas-works.

Under the last contract between the Stoke Fenton and Longton Gas Company and the commissioners of the Longton district, the duty of lighting of the streets, roads, lanes, and other public passages and places within the said district, including the said town of Longton, terminated on the 1st of May, 1858; and before the period (the 1st of September following) for lighting again the said company sent to the said commissioners a tender, in writing, for a renewal of the contract, under the provisions of the said first-mentioned Act. But, at the annual meeting of the commissioners of the Longton district, held on the 14th day of June, 1858, they rejected the said tender of the said company; and, at such meeting, the following resolution was carried by a majority of the commissioners present:—"That the Longton Commissioners agree to contract with the Longton Gas Company for the supply of gas to the public lamps, for the term of three years, upon the same terms as they are now under by their contract with the Stoke Fenton and Longton Gas Company; and they agree to give the Longton Company all the powers they possess under their local Act for breaking up the streets and laying pipes within the Longton district."

On the 15th day of June, a contract or agreement between the company and the commissioners was duly executed by the said commissioners, and the company whereby, "the said Longton Gas Company agreed with the said commissioners that the said company should and would for the term of three years, from the 1st day of September then next, supply with gas all the lamps belonging to the said commissioners then standing and being in the streets, roads, and other public places on or within thirty feet of the line of the mains of the said company, provided that if the commissioners, should at any time during the said term, erect any lamp or lamps within the said district beyond the limits last mentioned, the company would extend and carry their mains and service-pipes so as to supply such lamps with gas in case the commissioners should have previously agreed to remunerate the company for such extension. The lamps to be lighted between the 1st day of September, and the 1st day of May in each year of the said term. And the said commissioners contracted to pay the said company by way of rent for supplying the said lamps with gas the several sums following, that is to say £2 10s. 0d. for each lamp erected or to be erected, and so in proportion for a less period than a year, and the sum of 5s. 6d. per lamp for lighting, cleaning, and extinguishing the lamps, and the said commissioners thereby contracted to give to the said company the benefit and advantage of all and every power and powers which the said commissioners possessed under, or by virtue of the said Local Act for laying down and altering mains and service-pipes in the streets, roads, and other public places within the Longton District: a copy of this contract accompanies and may be referred to as part of the special case.

At the time of the passing of the said resolution of the Longton commissioners of the 14th day of June, 1858, the said Longton Gas Company (Limited) had not commenced to lay any mains or pipes within the said town of Longton; but, on the 29th day of July, 1858, a meeting of the directors of the said Longton Gas Company was duly held, for the purpose of making the necessary arrangements and contracts for the laying of mains and service-pipes, for the lighting of the said streets and other public passages and places within the town of Longton: and at such meeting a resolution was duly passed:—"That William Moore's tender for excavating and paving be accepted, and a contract entered into with him to be prepared by the solicitor and signed by the chairman on behalf of the company."

In pursuance of this resolution, a contract in writing was, on the 7th day of August, 1858, entered into, and signed by the chairman of the directors of the said last mentioned company on behalf of the company, and by the defendant William Moore, the person usually employed in paving the streets, by which the said William Moore contracted to remove bricks and stones, and cut trenches of sufficient width and depth, and in the directions required, for receiving the mains and service-pipes in and throughout the town of Longton. And, as the said mains and services were being laid by the said Longton Gas Company (Limited) immediately to fill in and pound the soil or earth so as to make the same again perfectly solid, and repair the footpaths, channels, and roads, and so as to reinstate the same in their former condition, and to the entire satisfaction of the said Longton Gas Company and the board of highways of Longton aforesaid; and, also, immediately, and without any delay whatever, remove all surplus earth and rubbish left in filling in again the said trenches or repairing the said footpaths, channels, and roads, from and out of the said streets, roads, and ways, of Longton aforesaid. And the said William Moore also contracted with the said Longton Gas Company to do as little damage as might be to the streets, roads, and ways, of Longton aforesaid, and the pavements and channels thereof, and as far as possible avoid injuring any gas or water-pipes of other companies, and creating or causing any nuisance or annoyance whatever to the inhabitants of Longton or others in executing the said works (a copy of this contract is annexed to and may be referred to as part of the case).

Under this contract, the laying of mains and pipes for the supply of gas within the said town of Longton by the said Longton Gas Company (Limited) commenced on the 9th day of August, 1858; and, between that date and the 23rd of September following, the alleged acts of nuisance charged in the several counts of the indictment were committed. The only acts done by Mr. Joseph Knight, one of the defendants, against whom the verdict of "Guilty," was entered, were, that he, being the owner and occupier of a house, contracted with the company to have it lighted, and then told the company's workmen to lay down the service-pipes for the purpose of connecting his house with the mains, which was accordingly done by the company's workmen. Of the other defendant against whom the verdict of "Guilty" was entered, William Moore was the contractor with the Longton Gas Company (Limited), as before mentioned, and William Hunt was the manager of that company, and the others were labourers and workmen being employed by, and acting under the orders and directions of the said William Moore, as contractor with or of the said William Hunt, as manager of the said company.

These defendants, on the said several days (for the purpose of laying down mains and pipes for the public lighting of the town of Longton, dug, and caused to be dug, trenches in and along the footpaths and pavements on the side of the several streets and highways named in the counts of the indictment, and in these trenches the said mains were laid and covered in; and from the mains so laid small pipes for the supply of gas were carried to the different public lamps and burners within the said town of Longton, for the purpose of the public lighting of the said town. The defendants also, on the said several days, dug, and caused to be dug, a great many other trenches in different parts of the said streets and highways, for the purpose of laying service-pipes, in order to supply gas to private individuals, for the lighting of private houses and shops, and other private buildings and places. These trenches were dug from the said mains, used for the public lighting of the town, in some cases across the footpaths and pavement only, and in one case across the footpath and pavement, and the public street or road, to the several private houses, shops, buildings, and places intended to be supplied with gas; and in the cross trenches so dug, iron service-pipes, for conveying the gas to the said private houses and shops, buildings, and places, were laid and covered in. The digging of these cross trenches, and the laying of these service-pipes, were in no way necessary, required, or used for the public lighting of the streets, lanes, roads, and other public places under the contract before mentioned, although lights in the shops, factories, and houses, at the side of such streets, roads, lanes, and other passages and places incidentally assist in lighting them. The digging of the cross trenches and laying of the service-pipes were done under agreements for the supply of gas between the said Longton Gas Company (Limited) and the private owners and occupiers of the several houses, shops, buildings, and places, and conduced to the convenient occupation of such houses, shops, buildings, and places, and were done at the request and with the approbation of the respective owners and occupiers thereof. The defendants used all reasonable despatch in digging the said trenches, and laying down the said mains and service-pipes, both for the public and private lighting of the town, and in restoring the said footpaths and pavements, and the said streets and highways, and during the time that the said trenches were being dug, and were open, and the said mains and pipes were being laid, the said footpaths and pavements, and the said streets and highways, were not otherwise interfered with than was necessary for digging the said trenches, and laying the said mains and pipes.

Before the trenches for public or private lights were dug, and the several mains and service-pipes were laid, the said Longton Gas Company (Limited) had obtained the consent of the Board of Surveyors of Highways of the said town of Longton, and the approval and the consent of the inhabitants of Longton, in public meeting assembled and convened by the chief bailiff "to

consider and determine on the best measures to be taken to promote the establishment of the Longton Gas Company" to the said trenches being dug and mains ane pipes being laid for both public and private lights.

The lord of the manor of Longton having been also applied to, had written a letter to the solicitor of the company in these words:—"Your company is quite welcome (so far as I am concerned) to lay down your mains and pipes in the streets of Longton; provided they agree to pay me £5. 5s. a year; as soon as the company is sufficiently constituted, you can send a draft of an agreement for their approval to my solicitors;" and after the acts charged in the four first counts, but before the acts charged in the fifth count, the company obtained license under seal of the said lord of the manor (which includes the township of Longton), a copy of this license is annexed and may be referred to as part of the case.

The special facts relating to the charges in each count of the indictment taken separately, are as follows:—

High Street, mentioned in this count, is built on both sides. In order to prevent the disturbance of the public traffic, either then or at any future time, two sets of mains for public lighting were laid longitudinally, one on each side of the street, under the foot-pavement, close by the curb-stones, and 10 feet from the centre of the roadway, in trenches 14 inches wide and 15 inches deep, no more than 50 yards being open at any one time, and the mains being laid and earth filled in again with all reasonable despatch. The earth was cast into the channel until the trenches were filled in again and the refuse was carted away as speedily as possible during the progress of the work; a part of the foot-pavement was left clear for the use of the foot-passengers, and no part of the roadway was obstructed and encumbered, and every reasonable precaution was used to prevent inconvenience or obstruction.

The pipes for private lighting were laid in trenches across the footway from the mains to the houses about 36 inches long, 15 inches deep, and 14 inches wide, and were opened, closed in, and completed with all reasonable despatch, during the progress of the work, every reasonable precaution was used to prevent inconvenience or obstruction.

Russell Street, mentioned in the count, is built part of its length on both sides and part on one side only, and one main for the public lighting of it was laid in the channel between the footway on one side and the roadway leaving the foot-pavement clear for foot-passengers, and the roadway clear for the passage of horses and carriages. The service-pipes for private lighting were laid in trenches across the footway 4 feet long, 15 inches deep, and 14 inches wide, and one of such service-pipes was laid in a trench across the roadway to a house on the opposite side of the street, one half only in length of such trench being open at one time, the remaining half of the road being free. In all other particulars, the statements above, respecting the mains and service-pipes and the trenches for them respectively in the first count mentioned, apply to, and may be taken as repeated of those in this count referred to.

As regards Sutherland Road, mentioned in the third count, the facts stated as to the second count apply in all respects.

Middle Cross Street, mentioned in the fourth count, is the street in which is the house of the defendant, Joseph Knight. In all other respects, the facts stated as to the second count apply to this street.

King Street, mentioned in the fifth count, is about 200 yards long. There was only one main laid, and that was laid under the foot-pavement on one side of the street, close by the curb-stone, there being scarcely any houses and no pavement on the other side. In all other particulars, the statements above, respecting the mains and service-pipes, and the trenches for them respectively, in the first count mentioned, apply to this street, except that in laying one service-pipe, the trench was opened from the main trench across the remainder (4 feet wide) of the footway at one time.

The court is to draw inferences of fact, and to be at liberty to give leave to have this case turned into a special verdict.

The questions for the opinion of the court are:—

1. Whether, under the circumstances before mentioned, the said Joseph Knight ought to be found guilty. If the court shall be of opinion in the affirmative, then the verdict against him is to stand on the fourth count, otherwise that verdict is to be set aside, and a verdict of "Not guilty" entered. In any event, the verdict against him on the other counts, is to be set aside, and a verdict of "Not guilty" entered.
2. Whether the verdict of "guilty" is to stand against the said defendants as regards the acts done for the purpose of the public lighting of the said streets, roads, lanes, and other public passages and places.
3. Whether the verdict of "Guilty" is to stand against the said other defendants as regards the acts done for the purpose of supplying gas to private individuals for the lighting of the said private houses, shops, buildings, and places. If the court shall be of opinion in the affirmative on either of the above questions then the verdict of "Guilty" is to stand on such one or more of the counts as the court shall direct; otherwise that verdict is to be set aside, and a verdict of "Not guilty" entered.

On the 21st ult., Mr. BOVILL, Q.C. (with whom were Mr. Serjeant PIGOTT and Mr. SCOTLAND) argued the case on the part of the prosecutors; and Sir F. KELLY (with whom were Mr. HUDDLESTON, Q.C., and Mr. P. M'MAHON) for the defendants.

Lord Chief Justice COCKBURN now delivered the judgment of the court. He said: The indictment in this case charged the defendants with obstructing certain highways and footways in the town of Longton, in the county of Stafford, by placing earth and bricks there, and by digging trenches therein. At the trial, the company and certain of the defendants were convicted, subject to the opinion of this court, upon a special case, from which the following facts appeared. In the town of Longton, there was a gas company established by an Act of Parliament, which incorporated the provisions of the General Gas Companies Act. There was also a body of commissioners for the purpose of public lighting, with powers to lay down mains and pipes for the public lighting of the town, but with no powers to supply or lay down pipes for the supply of private houses or individuals. The commissioners, who had formerly been supplied with gas by the old company, entered into a resolution to transfer, and did duly transfer, their powers to the defendants, the Longton Gas Company (Limited), who were a joint-stock company, but without any parliamentary powers as a gas company. The indictment was preferred against the company for obstructing the public highway by opening trenches and laying down pipes, and conveying gas to the public highway and to private houses. On the argument before us, it was conceded on the part of the Crown that the conviction could not be sustained against the defendants in respect of the acts done in making and laying down mains and pipes for the public lighting of the town, the acts in such respect being authorized by the powers transferred to them by the commissioners. It was admitted on the part of the defendants that they had no parliamentary powers which gave them authority to create obstructions or lay down pipes for private supply. The question, therefore, was confined to the acts done by the defendant in laying down bricks and earth and digging trenches, in one instance across the street, but in the other instances across the footway of the street, for the purpose of laying down supply or service-pipes to private houses, from the mains laid down under the powers of the commissioners for public lighting. It appeared that these service-pipes had been laid down by the joint stock company, at the request, and by the direction of the owners of the houses; and that they had been so laid down carefully without creating any unnecessary nuisance. It was not disputed, however, that the highway was obstructed, so as to amount to an indictable nuisance, unless the defendants were justified in committing the acts complained of in the exercise of the right of each householder to make such slight temporary obstruction on a highway or footway as necessarily incidental to the enjoyment of his property, such, for example, as the obstruction caused in using the common coal-holes in the pavements, the unloading of carts, the putting up boards for repairing, and other similar temporary obstructions. We are of opinion, that the present case does not fall within any of the exceptions to the general law as to the obstructions of highways. We find no authority according to which so wide and large an exception to the general rule is established, as would allow either a private person, or a body acting at the request of private persons, to open the streets for the purpose of supplying private houses with water or gas from sources from which a supply of water or gas may be procured. Such an act is not in any respect a user of the highway, such as occurs where a cart or carriage stops before a door, or where goods are unloaded on the highway, to be immediately taken into the house. Such matters may well be said to be a use of the highway as a highway, and this is made more clear by the rule that where there is an excess or abuse, in such case the party is indictable. Thus where, instead of using the highway merely for taking the goods in, the party sawed blocks of wood in the street before taking them in, he was held to be indictable for so doing. The case put of the coal-holes in the pavement of a street is perhaps the one apparently most in favour of the defendants. It is not, however, to be assumed that there is any right in the owner of a house to open the pavement to make a new coal-hole where none has existed before. He could not, we think, make a new hole in the middle of the street, if his cellar extended so far. In many instances, no doubt, such coal-holes may be of right, as where they have been made when the houses were first built, and so, as was suggested during the argument, the highway has been dedicated, subject to such use. In many cases of a single obstruction for a short time for the purpose of obtaining some such advantage, there would probably be no indictment, although the party might strictly be liable to indictment, and although, were such instances multiplied, it might become necessary to indict. It may be also that the almost universal use of coal-holes may have led to their not being complained of as they might be, from their being regarded as a usual if not a necessary means of enjoying the house if made in their usual place. They do not, in any of these respects, appear to be analogous to the case now before us; for there is no evidence that the right here claimed originated in any reservation, nor is its exercise matter of absolute necessity, nor is it one ordinarily exercised by the owners of property, except under parliamentary powers and subject to regulations imposed for the protection of the public. The case is not one of absolute necessity either for the party or for the public, as in the case of hoarding required during the repairing of a house, to protect the public, or in the case of putting a ladder against a house to clean windows, or to escape in the case of fire. General convenience is greatly against the allowing private persons or companies, without parliamentary powers, to interfere from time to time with the public streets. The making such openings from time to time for water, gas, sewerage, and other purposes, and the opening of the streets for repairs and alterations, are a serious inconvenience, even when done under the restrictions which an Act of Parliament puts upon the persons clothed with parliamentary authority so to act; and it would be difficult to see how far the annoyance might extend, if unauthorized dealings of this nature with the highways were allowed. Is every private person to be at liberty to open the street for laying down a pipe to any gas-works, or to any conduit of water, or to any well or fountain in a market place? How far is such right to extend? If everybody may lay down such a pipe from the nearest water or gas, how great would be the inconvenience from the continuous opening of the streets for the first laying down and for the constantly recurring purpose of repairing! Were such private rights as to gas, sewerage, and water-pipes to be allowed, the highways would be in a constant state of obstruction. The present is an exceptional case, where it happens, from the fact of the mains being laid for public purposes, that it is more easy to get at the supply of gas than in ordinary cases; but this ought not to affect the principle. The case does not seem to us to fall within what may be called the ordinary incidents and rights which in common sense and from common use are understood to appertain to the enjoyment of property. On the contrary, a right, as is here claimed, of interfering with the streets, is never exercised, except under the authority of Acts of Parliament conferring special powers, with great care, and under proper control in the case of gas, by placing the companies supplying it under the provisions of the General Gas-Works Companies' Act, according to which the parties are subjected to wholesome restrictions, and to the control of the magistrates. We think, therefore, that the obstructions in question are indictable, and that the conviction was right; and the verdict must be entered accordingly. A question was raised, but not very seriously pressed, as to whether one of the defendants, who had given directions to have the particular works done to his own house, was properly convicted. On this, we entertained no doubt, as the party giving orders to commit a nuisance is a principal in the transaction. It was agreed at the trial, that the defendants should be at liberty to turn the case into a special verdict, if the court should think fit to give them leave so to do; and, considering the importance of the question, we think it quite right that such leave should be given. If that course be taken, that which was conceded in the argument must be found as a fact in the special verdict, namely, that there was obstruction to the road; and the question must be, as to whether the parties are indictable for making such obstructions, under the circumstances. Our judgment will be for the Crown, as to the obstructions arising from laying down the service-pipes.

COURT OF EXCHEQUER.

WESTMINSTER SATURDAY, FEB. 25.

(*Sittings in Banco, before Barons* BRAMWELL *and* CHANNELL.)

HILLS, *v.* THE LONDON GAS COMPANY—JUDGMENT.

Baron BRAMWELL delivered the judgment of the court upon the rule obtained in this case to enter the verdict for the defendants or for a new trial. He said this was an action tried before me at Guildford in the year 1858, and I think occupied six—certainly five days; and the same number of

days were occupied upon the arguments on the rule here. I am now to deliver the judgment of the Court upon it. It is almost impossible to state the facts, nor is it necessary except as I consider them upon the questions which arose. I shall therefore not attempt to make any elaborate statement of them at the outset. The first objection I meet with is, that the verdict was against the evidence as to whether the plaintiff was the inventor of that for which he obtained his patent, and for which he specified. It was said that he was not, that he really had taken it from a person named Laming who had invented it—that is to say, not that he had copied it from any specification of Laming's, but being aware of the experiments which Laming had been carrying on, it was said that the plaintiff had in truth taken his invention and claimed to be the inventor of that of which in truth Laming was the inventor. This was purely a question of fact, it was left to the jury as such, and the jury found a verdict for the plaintiff. I need not go into the matter at length; it is enough to say there is the plaintiff's positive oath that it was his own discovery, and that he did not know of Laming's invention. He was also corroborated in this statement, and indeed if the fact of laying a certain pipe was true, he was corroborated as being earlier in date than Laming. On the other hand, there is no doubt Laming had invented his discovery before the plaintiff got his patent, and there were other circumstances more or less tending to make it probable that the plaintiff had taken Laming's invention. As I said before, it was a question purely for the jury; the plaintiff pledged his oath that his statement was true, and we do not feel warranted in disturbing the verdict upon that point—and, therefore, so far the rule may be discharged. The next question was with reference to a person named Croll. Croll, in the year 1840, obtained a patent for improvements in the manufacture of gas, and it was said that in the specification which he filed, in pursuance of the terms of that patent, he did disclose a part of the plaintiff's discovery. But, first of all, it was said as a matter of law that the defendant was entitled, pursuant to leave reserved, to enter the verdict for himself or a non-suit, because that upon a comparison of the specification of the plaintiff with the specification of Croll, it would be seen that the plaintiff had been anticipated by Croll. Now upon this part of the case the material facts are these. The plaintiff's invention was for the use of hydrated oxide of iron for the purification of gas from sulphuretted hydrogen. Mr. Croll, by his specification, which, by the way, I may say, is neither more nor less in consequence of its being a specification, and would be the same thing if it had been a paper appearing in a pamphlet or a scientific publication, or elsewhere; Mr. Croll, in his specification, after speaking of the use of the black oxide of manganese for this purpose, that is to say, for removing sulphuretted hydrogen from gas, goes on to say, that "the same effect may be produced by the application of the oxide of zinc and the oxides of iron, and treated precisely in the same way as above described." It was stated upon that, that upon a comparison of the two documents, the plaintiff, who only claimed the use of hydrated oxide of iron, had been anticipated by Croll, who claimed oxides generally. Now, upon the trial, the controversy between the parties was this—it was said no one could tell merely upon reading this document, or upon reading the two documents, that that was so; but, if the truth was known, the context of Croll's patent would show that he used, not hydrated, but anhydrous oxide; whereas, on the other side, it was said he used hydrated, or both; and that in either case the plaintiff had been anticipated by Croll. Well now at the trial, in order to prove that Croll meant anhydrous oxide, evidence was given, which it is not necessary to go into minutely, for the purpose of showing that it must be anhydrous that Croll meant, because he spoke of roasting the oxide which he used to a red heat, which would make it anhydrous, and therefore it was said anhydrous was what he meant. On the other hand, "the defendant gave evidence of a contrary character. Now, if we examine Croll's specification upon the face of it, or if we examine the specification with reference to the evidence given, we are equally of opinion that Croll meant both sorts of oxide—that is to say, the anhydrous and the hydrated. The truth is, what Mr. Croll meant was accurately expressed by himself; he said—"I did not know the difference between the two; I used what I knew to be an oxide, but I did not know whether it was hydrated or anhydrous." There is no doubt he did use the hydrated, and there is nothing in his evidence to show that the oxide he used became anhydrous, because it does not appear that the heat he applied to it was sufficient to make it anhydrous. Moreover, if it did it would be immaterial, for this reason—it appears it does not depend upon whether the oxide was anhydrous or hydrated, and that either will absorb sulphuretted hydrogen. That appears to be a property of the oxide depending upon its molecular constitution, and is equally true of hydrated and anhydrous; that is to say, if you make hydrated anhydrous, it will equally absorb sulphuretted hydrogen. That being so, it is perfectly possible that Croll might have used the hydrated in the first instance, which became anhydrous afterwards; but it would not be the less true that he commenced with the hydrated. So that, whether we look at the words "oxides of iron" alone, or with this explanation, Croll specified for the use of anhydrous and hydrated; and, if the matter rested there, it would be manifest that Croll had anticipated the plaintiff. But, upon the arguments before us, Mr. Grove put forward a consideration which was not urged upon the trial. He said, "It is true Croll said 'oxides,' and it may be true that he meant all oxides; be that as it may, that is not such a publication as would preclude the subsequent discovery by the plaintiff. Because," he said, "there are many oxides—there are natural oxides and artificial oxides, hydrated and anhydrous; some will, and some will not purify, and, therefore, it is a matter of experiment which will, and which will not." Now, to that argument we accede, as a matter of law, for it is impossible for us to say that the subsequent discovery of that which will effect the object cannot be the subject of a patent. That may be manifested in this way. Suppose that Croll had said, "Some of the oxides will do;" could it be said, that in that case the courts of law would say, "There can be no invention in saying which will?" But, put it a little further. Supposing he had said, "Some substance, of which iron is the base, will do it." Would that do? If so, why would it not do to say, "some metallic substance?" and if so, why not say, "something?" As a matter of law, as soon as a person says, something will do and something will not, it is impossible for the Court not to say, that is itself a matter of experiment to see which will. It may be said, "Croll says *all*, not some." How can you say, all will, which is the truth, and some will not, which is untrue—how can that be said to be such a statement as to set aside an invention afterwards discovered? It is impossible it can be said, and the result is, therefore, that we accede to Mr. Grove's argument, that upon a comparison of these two instruments we cannot say the plaintiff is precluded as a matter of law from being the inventor. So, upon this ground, the Court is of opinion that it would have been wrong to nonsuit him on the trial, or to direct a verdict for the defendant. I may here make an observation upon a case which was relied upon—the case of *Bush and Fox*. We do not think that we are deciding anything contrary to *Bush and Fox* by this decision. Bush and Fox decided that there may be cases in which, upon a mere collocation of documents, the court will say the plaintiff has been anticipated. Undoubtedly it may be so; they may be in the same words, or if varied in words, there may be no variety in the thing, and probably this would be found in the case of a mechanical patent. This would be much more easily the case there than in the case of a chemical patent, or in other cases in which what one may call the occult qualities, or those which are not the subject of ocular knowledge, are the subject of a patent. I do not know that the court would not take notice of the fact that iron is heavy, or that it would fall without support, but the court is not bound to know that hydrated oxide of iron will purify gas from sulphuretted hydrogen. Therefore, the case of *Bush and Fox*, which we accede to, is not in any way infringed upon by what is done in this particular matter. Well then, it was said that Croll's patent, when explained, and his practice under the specification, were such a previous acting upon the matter as precluded the plaintiff from being the inventor, not in point of law, but in point of fact, and that the verdict of the jury in this part of the matter was against evidence. As I said before, the contention at the trial was this: the plaintiff said Croll meant anhydrous oxide; the defendant said he meant hydrated, or at all events hydrated and anhydrous. That question was left to the jury, not in those words, but it was put to the jury whether, upon hearing the scientific evidence, they could say that Croll in his patent and in his practice did anticipate the plaintiff so as to preclude him from being the discoverer, and they found a verdict for the plaintiff. Now it appears to us that the true question was not put to the jury, because the proper question to put to the jury was this.—"I tell you, gentlemen, as a matter of law, that Croll comprehends both anhydrous and hydrated, and it is for you to say, whether, with the scientific evidence given to you, the plaintiff is the discoverer, because, inasmuch as all hydrated oxides will not do, in point of law it is a possible matter of invention and discovery." That ought to have been the question left to the jury, and that was not the question which was left to them. Well, then, what ought to be done with it? The jury said, we do not think Croll anticipated the plaintiff. When I say the proper question was not left to them, it is not intended to be in effect an acknowledgment that I was in the wrong, for it was in no sense my fault, because the question was not made by either side, and I certainly could not be expected to pick out a question in a chemical patent which neither the counsel nor the witnesses for the defendant had made. What are we to do now? Are we to say, because the question was not left to the jury, that that is to be a ground for a new trial? It seems to us that it ought not to be so, except we can see that upon a fresh trial the jury would come to a different conclusion. We cannot think that they would; on the contrary, we think that the jury would come to the same decision as the former one. The question put to the former jury was in words—did Croll anticipate the plaintiff? The jury said no; and we think that, if the question had been put as it ought to have been put, they would have returned the same answer, because it was manifest that Croll had the vaguest notion of what he was speaking about. Laming afterwards considered himself the inventor of this matter also; and there is no doubt in the world that the use of the hydrated oxide of iron, as the plaintiff has specified, had not been used in common. It may be said too that nobody had found out the renovating power of the oxide. If that is so, it suggests this remark—that it was really hard upon the plaintiff, the value of whose invention consisted in the renovation of the material, that he should be beaten upon a matter which he need not have specified. The result is, therefore, that there will be no new trial on this point. My brother Channell says it certainly is so; the direction in terms includes this—if it does not include it in terms, probably it was because the parties did not ask for it; and when we come to consider whether there should be a new trial, we think the jury would have found their verdict in the same way if the question had been put as it ought to be. Then it is said the jury have found an imperfect verdict in reference to what Croll did, and not only in reference to his specification. A great deal was said about the question of experiments. It appeared that Croll did purify many thousand cubic feet of gas, and it was argued that that was beyond an experiment. But the word experiment in the cases referred to has been used not as a sole test upon a matter of this sort, but as using a class of practice. There is no particular virtue in the word experiment. It is used for the purpose of saying that, if there has not been a user of the invention of a substantial character, but rather of the experiment character, or of a character analogous to experiment, then, although the thing has been done before, it does not preclude a person taking out a patent for it. So that, although what Croll did was not strictly by way of experiment, it was in the nature of an experiment, and the jury have so found it. Then the next question to which I call attention is one that arose on the patent of a person named Laming. Now, Laming specifies for the use of chloride of calcium, and he describes how he makes it—that is, by using muriate of iron and other things, and lime or chalk. He then says, "the oxides or carbonates which result, are useful for the said purification, and need not be removed." In truth, therefore, Laming claims chloride of calcium, which he says he uses with the oxide of iron produced in the preparation of the chloride of calcium. It is obvious from the consideration I have adverted to in Croll's patent; we cannot say, as a matter of law, that Laming has anticipated the plaintiff—his claim being for chloride of calcium, and the plaintiff's for oxide of iron. But then, it is said, although as a matter of law we cannot say that Laming anticipated the plaintiff, can it be said as a matter of fact that it ought to be so found by the jury and that their verdict is against evidence. Now upon this we must not only see what the plaintiff says but what he did, and what Laming says and what he did. Laming says, "I use chloride of calcium and I make it in a particular way which produces oxide of iron, and I use the two combined; therefore, what in practice he used and what he specified was the use of muriate of lime and hydrated oxide of iron mixed; but the plaintiff, as I have said, claims hydrated oxide of iron, and he shows how he makes it—I will only mention one thing in particular—with sulphate of iron and lime. He at least says, it may be so used. It was said that this difference between the two was a colourable one, and that what Hills had in reality done was this: he had borrowed Laming's use of the hydrated oxide of iron; and that if he had used muriate of iron in the same way as Laming had in the preparation of the oxide, it would have stood thus, that Laming would have used and said that he used muriate of lime and oxide of iron, while the plaintiff would have said, "I use oxide of iron," but would in effect have used oxide of iron and muriate of lime—the difference being that the one put the one thing first, and the other the other; and it was said therefore that putting sulphate instead of muriate was a mere colourable difference. Now it is not necessary to say what would have been the case had the plaintiff used in fact the muriate of iron, whether even in that case he might not have said, "I claim for the use of hydrated oxide of iron, and I say it can be used separately from the muriate of lime." Possibly, in that case, he would have been the inventor, even if he had said in his specification, "Why, I have carefully avoided Laming's; I know he uses hyrated oxide of iron and muriate of lime—my object is to use the oxide without the muriate." But it is not nececessary for us to deal with that. The plaintiff uses sulphate of iron,

and it was sworn on his behalf and not contradicted, that the muriate of iron—the iron which Laming uses—produces a deliquescent salt in the shape of chloride of calcium, whereas the sulphate of iron used by him was not deliquescent. Whether that was or not a colourable variation was left to the jury. On the part of the plaintiff, it was sworn that it was not, for the chloride of calcium could not be used on account of its deliquescence, whereas the sulphate as used by the plaintiff was not open to that objection; and the jury found a verdict for the plaintiff on this point also. It may be, undoubtedly, that the plaintiff was not aware of this benefit, for it is certainly a remarkable thing that he uses magnesia and some other materials which would also produce a deliquescent substance, and it may be, therefore, that in specifying for the sulphate of iron he was specifying for a substance of which he did not know the value. I do not mean to say it was so; I have no right nor inclination to say so, but it was a question left for the jury, consisting of eleven special jurymen and one intelligent common juryman, and they found for the plaintiff. Upon this point, we feel it impossible to say that the verdict was wrong in the sense of directing a new trial. So much, then, for Laming's specification. Then the next objection was, that the plaintiff's specification was insufficient on this ground. He says, "I use the hydrated *or* precipitated oxides." Well, it was said that that included all the hydrated oxides, and that, inasmuch as some of the hydrated would not do, which was admitted, therefore the plaintiff's specification was void. Now that question turns upon this:—If the plaintiff's specification means *all* the hydrated, why it is open to that objection; but if it means only those hydrated oxides which are also precipitated—that is to say artificially prepared oxides—it is not open to the objection. One may say upon this part of the case that the language is in any sense ungrammatical—"hydrated or precipitated"—the whole or a part cannot be right. To say "the works of Shakespeare, or 'Hamlet' and 'King Lear,'" would be obviously an incorrect expression, which you cannot judge of by the ordinary rules of grammar. You must endeavour to find out the proper meaning to be put upon these incorrect expressions, and it appears to us, looking at the whole specification, that he used them alternatively, "hydrated or precipitated," for he says, "hydrated or precipitated oxides of iron may be conveniently prepared by decomposing, &c.;" and therefore it is obvious that he uses the word "hydrated" as synonymous with "precipitated," and consequently when he speaks in his specification of using hydrated or precipitated oxides, he means such hydrate as is precipitate. That is the construction which we put upon this expression, and therefore we think the objection falls to the ground. Then it was said next, that the mere application of hydrated oxide of iron to absorb sulphuretted hydrogen from gas was not the subject of a patent, its properties and effects with reference to sulphuretted hydrogen being previously well known. To that we do not agree. The answer to it is, that the question is not properly stated. The application of hydrated oxide to sulphuret is a principle, and if a man was to claim hydrated oxide for the purification of gas without saying how he did it, possibly the objection might be well founded; but the plaintiff says, "I claim it in this way," and shows how it may be made practicably useful. Therefore this objection fails. So in like manner with the objection that the renovation of hydrated oxide of iron by exposure to the air being previously well known, its application to purifying gas was not the subject of a patent. We deal with that in the same way. The sixth objection is that the specification of the plaintiff, as amended by the disclaimer, is not within the title of the patent as amended. I am not very sure in my own mind that I have the faculty for apprehending that extremely subtle point, but as far as I do apprehend it, it appears to me to be unfounded. It was not pressed upon us, and out of the seven days occupied by the arguments it took up but a very small portion. It really is within the title of the specification, which is "an improved mode of compressing peat, and making fuel for gas and of manufacturing gas, and of obtaining certain substances applicable to purifying the same." Well it is an improved mode of manufacturing gas—viz., that you pass it through hydrated oxide of iron, and then renovate the oxide by exposure to the air. Then the next is that, having disclaimed the former part of his title, the plaintiff could not claim for the renovation of the purifying material. A similar remark might be made as to that, because we think there is nothing in his disclaimer which precludes his making the claim that he has done, and this objection also fails. The result is, therefore, that we think the rule should be discharged, both as to the new trial and as to entering the verdict for the defendant. I may say that the judgment I am now pronouncing as to entering the verdict, that the rule should not be made absolute, is the judgment of the Lord Chief Baron, and my brothers Watson and Channell, and myself, and I am glad to say we are able to give an unanimous judgment upon that matter. The judgment that the rule should not be granted for a new trial, on the ground that the verdict was against evidence, is the judgment of my brother Watson and myself. He and I and the Lord Chief Baron, were the only persons who heard it argued, and the Lord Chief Baron takes a different view. Therefore, upon that matter, it is only with our authority, such as it is, against my Lord's. The result will be that the rule will be discharged.

Miscellaneous News.

SALE OF GAS ACT.

RETURN TO AN ORDER OF THE HONOURABLE THE HOUSE OF COMMONS, DATED FEB. 22, 1860;—FOR,

COPY "of the report of the Astronomer-Royal, dated the 11th day of February, 1860, on the Instrumental Equipments of the Exchequer Office of Weights and Measures, as regards the means for preventing Fraud in the Sale of Gas to the Public; and on the Amendments which may be required to the existing Legislation on that subject:"

"And, of the Letter from the Comptroller-General of the Exchequer, dated the 17th day of February, 1860, to the Treasury, in reference to the said Report."

Royal Observatory, Greenwich, S.E. Feb. 11, 1860.

Sir,—I had the honour to receive your letter, dated 13 December, 1859, conveying the desire of my Lords Commissioners of Her Majesty's Treasury that I should furnish to them a report as to the completeness or otherwise of the means provided by the Act 22 and 23 Vict. c. 66, for preventing frauds in the sale of gas to the public, so far as relates to the standard and apparatus for ascertaining the quantity supplied, and also requesting that I would make such further report as may enable Her Majesty's Government to consider whether any and what amendments may be made in the law.

2. In order to prepare myself for presenting a report worthy of their Lordships' consideration, I have by personal inspection made myself acquainted with the principal constructions of gas-meters and other apparatus used in registering the amount of passing gas, and also with the methods of using these in the offices of gas-manufacturing companies, gas-meter manufacturers, and gas-meter inspectors. I have also perused various documents, manuscript and printed, obtained from different sources, or transmitted to me by authority of their Lordships, and have examined the regulations adopted in foreign countries, so far as I have been able to procure them.

3. I propose to arrange my report under the following heads:—

(I.) On the instrumental equipment contemplated by the Act as required for the Exchequer Office, and on the extent to which this has been supplied.

(II.) On the further equipment necessary for local offices, not expressed in the Act.

(III.) On the enactments in the Act for the examination of gas-meters.

(IV.) On further enactments which appear to be necessary for the examination of gas-meters.

(V.) On the general recommendations which appear to follow from these considerations.

4. On the first of these heads, namely—

"On the instrumental equipment contemplated by the Act as required for the Exchequer Office, and on the extent to which this has been supplied,"

I have the honour to make the following statement:—

5. The second section of the Act prescribes, as "the only legal standard or unit of measure for the sale of gas by meter," the "cubic foot, containing 62·321 pounds avoirdupois weight of distilled or rain-water, weighed in air at the temperature of 62° of Fahrenheit's thermometer, the barometer being at 30 inches;" and the third section directs that, "within three months next after the passing of this Act, models of gasholders measuring the said cubic foot, and such multiples and decimal parts of the said cubic foot as the Lord High Treasurer or the Commissioners of Her Majesty's Treasury of the United Kingdom shall judge expedient, shall be carefully made, with proper balances, indices, and apparatus for testing the measurement and registration of meters; and such models shall be verified under the direction of the Lord High Treasurer or the said commissioners, and, when so made and verified, shall be deposited in the office of the Comptroller-General of the Exchequer at Westminster."

6. Acting under the authority given by your letters of 1859, October 14 and October 25, and having secured the valuable assistance of Professor W. H. Miller, I caused to be prepared by Mr. L. Oertling, (of 12, Store Street, Bedford Square) a weight of 62·321 pounds, constructed of hard gun-metal; and by Messrs. E. W. Ladd, and Company (of 1, Old Jewry) a metallic vessel or bottle, intended to contain one cubic foot, constructed of tinned copper, in shape a cylinder with a cone at each end, the upper cone having a small cylindrical neck for the introduction of water, and the lower cone having a tap for its discharge. I also obtained from Mr. W. Crosley (of 103, Southwark Bridge Road), for temporary use during the preparation of another instrument of the same class, by its inventor, Mr. Alfred King, of Liverpool, an instrument of excellent workmanship, which has sometimes been called the "transferrer," but which, for reasons to be mentioned below, I shall term the "gasholder," consisting of an upper chamber containing exactly the volume of one cubic foot, and a lower chamber containing more than one cubic foot, and adapted with proper arrangements of cocks and pipes, by repeated discharges of the water filling the upper chamber into the lower chamber, to discharge in succession any number of volumes of air, each of one cubic foot, into any vessel properly prepared for their reception.

7. On Monday and Tuesday, 1859, November 14 and 15, under the personal superintendence of Professor Miller and myself, the following verifications were made. First, by means of a selection of standard weights in the Exchequer office, with the addition of some very minute auxiliary weights, an aggregate of 62·321 pounds was formed; and by means of the excellent large balance in that office, Mr. Oertling's weight was examined, adjusted, and verified, and was left correct without sensible error. Secondly, Mr. Ladd's vessel of one cubic foot was attached to the scale-beam empty, and counter-balanced; then it was filled with distilled water, and the auxiliary weight which was to be combined with or against Mr. Oertling's weight, in order to produce equilibrium, was ascertained; the barometer and thermometer being observed, and numerical corrections being applied for the difference between their readings and those specified in the Act of Parliament; the water was then discharged from the vessel, its lower tap being closed five minutes after the cessation of continuous running, and its weight was ascertained in that state, and the points to which the vessel must be filled with distilled water, either for the intromission or for the discharge of 62·321 pounds of water, were ascertained. Thirdly, by the use of this vessel, one cubic foot of water was discharged into the upper chamber of Mr. Crosley's gasholder (water having been previously passed through it, with five minutes' draining after the cessation of running, in order to moisten its sides), and it was found to be perfectly correct.

8. Their lordships will perceive from these details that the three standard instruments—viz.:

The weight of 62·321 pounds,
The vessel containing one cubic foot,
The gasholder, adapted to give successive discharges of one cubic foot of air—

have been prepared logically and carefully from the fundamental standard weights deposited in the Exchequer office, and in strict accordance with the spirit of the Act. It will also be perceived that no provision of a "balance" was necessary, the excellent balance of the Exchequer office being sufficient for all wants in this verification; and that, from the nature of the instruments, no indices or other apparatus are required.

9. I propose that the parliamentary term "gasholder," the application of which in the Act is not strictly defined, be specifically appropriated to the third instrument (which, as I have said, was sometimes called "tranaferrer," but which I now call "gasholder"), for the following reasons:—

(*a*). The instrument in question is competent, although not conveniently applicable, to the measure of any amount of air or gas; ostensibly, to any number of entire cubic feet; but really, by making use of the graduations on other instruments, to the fractional parts of a cubic foot. In this way it may be applied to verify gas-meters.

(*b*). The instrument in question is a complete and indivisible instrument, easibly portable; its copies can be safely brought to the Exchequer for verification, and the Exchequer stamp will be authentic evidence of their correctness.

(*c*). The more convenient instruments for immediate measure of several cubic feet, with fractions of cubic feet, are not portable in their complete state; they must be separated; and therefore, if brought in parts to the Exchequer, although verified there in a united state, the Exchequer stamp would convey no evidence that they were subsequently united in the same state.

For these reasons, I conceive that the instrument in question is to be ac-

cepted as the true and proper "gasholder" contemplated in the Act of Parliament.

10. The third section of the Act alludes to "gasholders measuring such multiples and decimal parts if the said cubic foot as the Lord High Treasurer or the Commissioners of Her Majesty's Treasury of the United Kingdom shall judge expedient." After careful consideration, I state to their lordships my opinion that no such multiples or decimal parts are required. There is no need to provide at the Exchequer (as matters of detail, subordinate to the general principle of equipment) any models except such as are comparable with copies that will be brought for verification for local offices, and I conceive the one-foot gasholder to be the largest instrument that is properly portable. The other convenient instruments to which I have alluded, cannot, as I have stated, be safely brought, and moreover, if they were brought, as they must be graduated to single cubic feet, the one-foot gasholder only could be used for them. The subdivision of the cubic foot into decimal parts will be far more conveniently effected on the derived or compared instruments than it could be done by any original instruments at the Exchequer office.

11. Resuming these several points, I have the honour to submit to my Lords that the Exchequer office is now completely fitted with the models and other apparatus required by the 3rd section of the Act 22 and 23 Vict. cap. 66, in the full meaning of the Act. The substitution of Mr. King's gasholder (when duly verified) for Mr. Crosley's, which I think desirable, will in no way alter this decision.

12. As in close connexion with this subject, I take this opportunity to remark that it will be necessary to define the amount of error, above or below, which may be tolerated in each cubic-foot vessel or gasholder to be stamped at the Exchequer office. I believe that an allowance of half a cubic inch or 1/3456th of the whole, may with propriety be adopted for the present. The Lords Commissioners of Her Majesty's Treasury, I am advised, are competent to direct this, without requiring the authority of Parliament.

13. The weights, copies of the weight of 62·321 pounds, required for local offices, will be properly stamped in the same manner as other weights verified at the Exchequer office. The cubic-foot measures and the gasholders will be stamped without injury, by means or the stamping instrument which Mr. Ladd has prepared under my instructions.

14. My second head treats

> "On the further equipment necessary for local offices, not expressed in the Act,"

on which I have the honour to invite their Lordships' attention to the following remarks:—

15. The gasholder, as I have stated above, is competent for testing with accuracy the volume of air or gas passing through a gas-meter; but its application to that purpose would be very slow and inconvenient. In consequence of this, two other instruments have been used for the actual testing of gas-meters, namely,

> (A). The instrument frequently called a gasholder, but which I shall here call "gas-measurer," resembling in its general shape the large gasholders at gas-manufacturing works, but containing only five or ten cubic feet (sometimes, perhaps, more), and having a graduated scale, so that the measure of the vacuity of the vessel above the meter level is indicated with considerable accuracy. This instrument is used, I believe, at every manufactory and testing-office in Britain and in foreign countries.
>
> (B). The standard gas-meter, being merely an ordinary gas-meter constructed with great care. This is extensively used on the Continent, but is not used, I believe, in Britain.

16. The practical necessity which exists for using one of these instruments, seems to render it indispensable that they should be duly recognized in any satisfactory legislation on the general subject. And with regard to the gas-measurer, there is this peculiar anomaly: the instrument cannot (for reasons already stated) be brought for verification to the Exchequer office; nevertheless, as it is the instrument on which the testing of every meter will depend, it ought to be verified and attested by an authority superior to that of the ordinary inspector, who is to use it for verification of great numbers of individual gas-meters. And this is the more necessary in consequence of the delicacy of the instrument in certain respects, and on the liabilities to failure depending on different constructions, as will appear from the following details.

17. The scale may be on the side of the descending bell, or holder of gas (as is expressly ordered in the Belgian, French, and Prussian regulations); this construction is free from some uncertainties, but may introduce error unless there are two scales on opposite sides; and, moreover, the scale will be liable to tarnish. The scale may be fixed on a fixed pillar at one side, the bell carrying only an index; this is free from tarnish, but the other remarks are applicable. The scale may be a circular graduation upon the wheel, or pulley, over which passes the counterpoise chain; but there are risks of irregular stretch of the chain, insecure fixation on the pulley, and (if the whole weight of the bell is supported on its centre) of distortion of the crown of the bell.

18. In verifying the gas-measurer, it is necessary to attend carefully to the exact counterbalance of the bell at all elevations. And when, by intromission of successive cubic feet of air from the gasholder, the gas-measurer is to be graduated, it is of the utmost consequence to attend to temperature, and to the accidents which may disturb temperature. Thus, when the sides of the bell are rising wet from the cistern, the sudden opening of a door, which may allow a blast of dry air to fall on it, may instantly lower the temperature of the inclosed air by 10°, or may diminish its volume by more than 2 per cent. (I may here remark, that in the first and second constructions mentioned in last paragraph, the bell is necessarily exposed, in order to make the scale visible; in the third, the bell may be shielded by an external covering of the entire mechanism.)

19. The standard gas-meter is a ruder instrument, and ought not to be used where the gas-measurer can be used; its use ought, however, to be permitted for the examination of gas-meters *in situ*. But for these it ought to be verified with extraordinary care, deriving its authenticity from the gas-measurer.

20. Their lordships will perceive that unusual care and judgment are required for verifying the gas-measurer, and also for laying down rules for its use in the testing of gas-meters. Two ways only suggest themselves to me as proper for overcoming these difficulties; the first is, that the county magistrates, or town council, &c., should select some person of repute, unconnected with their district, to make these verifications and to lay down these rules. The second is, that an itinerant officer of the Exchequer should be appointed, under their lordships' immediate authority, to verify and stamp with the Exchequer stamp (on a drop of hot solder, as in all foreign countries) the gas-measurer and standard gas-meter. This, I believe, would be more satisfactory to the public. And I think it highly desirable that power should be given to their lordships to lay down instructions, having the force of law, for the verification, and also for the use, of the gas-measurer and standard gas-meter. It is, I conceive, impossible to provide by Act of Parliament for the cases which will arise in a matter so technical and so varied as is this. Among other things, the amount of error to be tolerated in the gas-measurer must be defined; perhaps 1-100th of a cubic foot in a 10-foot measurer, and a smaller quantity in smaller instruments would suffice.

21. I proceed to my third head, namely—

> "On the enactments, in the Act, for the examination of gas-meters;"

and under this head I have very little to remark. The provisions, as far as they go, appear to me excellent, although I shall have occasion to point out what appears to be a very serious omission.

22. I would, however, invite their lordships' attention to the phraseology of the second and third clauses of section 13 of the Act, in which are used the expression, "passing the quantity of gas, or atmospheric air, per hour," and the like. The grammatical construction of these words seems to imply that at least one hour is to be occupied in each examination. As this is unnecessary and impracticable, and cannot have been the intention in framing the Act, I would submit whether it would be desirable in future enactments to explain this as meaning merely "at the rate per hour," leaving the exact duration of time, or quantity of gas, &c., to be settled under the instructions which I have proposed in paragraph 20.

23. My fourth head treats

> "On further enactments which appear to be necessary for the examination of gas-meters;"

and, in order to make my remarks intelligible, I must premise a few words on the construction of the registering part of a gas-meter.

24. The axis of the revolving gas-drum (in a wet meter), or the crank axis (in a dry meter), bears a worm, which acts in a toothed wheel of the spindle, and causes it to revolve very slowly. A worm on the spindle works in a second wheel, and causes it to revolve still more slowly. A pinion connected with this works in a large wheel; a pinion of that wheel works in another large wheel, and so on, in every case causing the successive wheels to revolve more and more slowly. The three slowest of these wheels carry indexes, like the hands of a clock, upon graduated dials; the slowest index usually revolves once when 100,000 cubic feet of gas pass through the meter, the next for 10,000 cubic feet, the last for 1000 cubic feet. The circumference of each dial is divided into ten parts, and thus the smallest quantity indicated is 100 cubic feet; this denomination is low enough for ordinary adjustment of accounts for gas supplied, as the worth of 100 cubic feet of gas is about 5*d*. or 6*d*.

25. The figures indicated by the three indexes being copied on paper in the ordinary sequence of decimal numeration, and two ciphers being placed after them, the sum so expressed is used as the basis of calculation of the number of cubic feet of gas which have passed through the meter, and of the amount of money due from the gas consumer to the gas producer. It is evident then that the point to be ascertained, before authenticating by inspector's stamp the correctness of the meter, is whether the series of figures presented by the three indexes does really indicate with correctness the number of cubic feet of gas which have passed through the meter.

26. It is impracticable to verify, directly, the indications of the dials, because the motion of even the quickest of the indexes is so slow. A 30-light meter (such as is proper for a large house), passing about 150 cubic feet per hour, would require 40 minutes of time in testing, to make the quickest index pass over a single one of its smallest spaces. A 10-light meter would require about two hours for the same motion of index. To remove this difficulty, the following contrivance is used in all meters, British and foreign. Upon the spindle to which I have alluded, is fixed a small index-drum, graduated on its circumference. This spindle and index-drum revolve once, every time that a conveniently small quantity of gas (as five cubic feet), passes through the meter; and the meter is, in all cases, examined and certified by reference to the indications of this index-drum, without any regard to the indications of the indexes on the three dial plates by which the charge for consumption of gas is ascertained.

27. The question, whether the amount of passing gas is duly recorded on the three dial plates is now separated into two questions; namely, whether the amount of passing gas is duly recorded by the index-drum; and whether the record on the index-drum agrees with that on the three dial plates? The first of these questions can be answered with all desirable accuracy, by the usual reference to the inspector's gas-measurer; but to the second, no answer can be given. Neither the gas-consumer nor the meter-inspector ever examines the wheel work which connects the index-drum with the dial plates; nor could they do so if they desired it, the wheel work being so enclosed in a box as to be beyond the reach of examination. The Act, which uses the general word "testing," without any description of the process, must be interpreted, I presume, as sanctioning the process in ordinary use at the time of its enactment; and it cannot therefore be cited as compelling any examination of the connexion between the index-drum and the dials. The door, therefore, is left wide open for any amount of error, even to the extent of charging five times the quantity of gas really consumed, by an error of blunder or fraud in adjusting the train of wheels between the index-drum and the dials; and the Act 22 and 23 Vict. c. 66, is nugatory and useless.

28. The apprehension of the occurrence of error, which I have conveyed at the end of last paragraph, is supported by fact. The following history came to my knowledge. I give it as a memorandum, certainly correct in all essentials, and, I believe, correct in all details. Complaint was made to a branch gas-office of overcharge in a meter. The meter was examined by the company's inspector, and found correct. The complaint was repeated; the meter was then examined by the official inspector, and found correct. The complaint was twice again repeated, and the meter was twice again examined, and found correct. At last, the wheelwork was opened and examined, and it was found that, in consequence of the insertion of an erroneous wheel, the just charge for gas consumed was doubled, and a considerable sum was, in consequence, reimbursed to the consumer. On my citing this at the company's principal office, I was at once informed that there had been repeated instances of the same kind. I feel it my duty to give this history on my own responsibility, without reference to the name of the company, remarking only that it is inferior to none in Britain in the correctness of its conduct of business in general.

29. The necessity for examining the wheel-work between the index-drum and the dials has not escaped the Legislatures of various foreign countries. In every instance in which I have had access to their detailed instructions, I have found distinct allusion to it. On account of the importance of the subject, I cite some textually.

> Prussian instructions (July 10, 1853), reprinted in the *Journal für Gasbeleuchtung*, September, 1859. After insisting on the importance of the "Zählwerk," and stating that its box is to be firmly connected with the meter, it proceeds:—"Bei den zur Aichung gestellten Gas Messern darf aber jene verbindung noch nicht bewirkt; die Blechkästen,

welche die umwandung bilden, dürfen vielmehr nur lose aufgesetst sein, damit sie zur Prüfung der richtigen Anordnung des Zählwerkes abgenommen werden könnten."

Belgian Instructions, reprinted in *Le Gaz*, 15 October 1859. The title of section iv. is, "De la vérification du mécanisme indicateur." Paragraph 3 says, "Il est donc indispensable que le vérificateur s'assure de l'exactitude et de la regularité du mécanisme dont il s'agit, et qu'après avoir constaté que chaque roue et chaque pignon a le nombre de dents necessaires, il appose la marque du poinçon sur ces pièces." Then paragraph 4 proceeds, "En montant le compteur, le fabricant aura soin de disposer les roues de manière que les empreintes du poinçon soient apparentes et pussent être vérifiées par l'agent du service au moment de commencer les experiences au gazomètre."

French Instructions, reprinted in *Le Gaz*, 30th September 1857; section iv., last paragraph, "Le vérificateur devra, avant de les poinçonner, s'assurer de l'exactitude du mécanisme indicateur à cradran."

Hanoverian Instructions. Translation communicated by the British Resident Minister, Art. vii., "In the gas-meters which are sent to be tested, the indicator must be accessible, so that it can be properly tried. But afterwards the indicator, together with the cylindrical case, [revolving gas-drum, the meters being all wet meters,] must be put out of reach of any arbitrary change."

30. For ascertaining, with reasonable facility, the correctness of the wheel-train, two principal methods suggest themselves.

The first is, that of mounting each wheel so as to turn, not with an axis and two pivots, but by having its wheel and pinion bored, so as turn upon a fixed stalk; the face of the wheel carrying the numerated dial, and the index for that dial being fixed, the front plate being then entirely removed, and more than half of each toothed wheel and numerated dial being always in sight. Messrs. Paddon and Ford, of 2½, Foundling Terrace, Gray's Inn Road, have undertaken, on my suggestion, to carry out this, and no difficulty is anticipated. In practical use, there would be the trifling trouble of counting the threads of the worm and the teeth of the wheels, and ascertaining that their numbers bore the proper proportion.

The second is suggested by Mr. W. Crosley, of 103, Southwark Bridge Road. It is to the effect that the wheel-train (including the index-drum and a socketed-spindle which carries it) should be constructed separately, and be separable from the wheel in which the worm of the gas-drum or crank-axis acts, and from the spindle of that wheel; the only union of the moveable parts being made by slipping two slots of the index-drum's socketed spindle upon a cross-head of the wheels' spindle. In this construction, without any counting of teeth, the relation between the movements of the index-drum and of every one of the wheels can be tested in two or three minutes, and the three stamps securing the invariability of the frame, of the wheels, and of the index-drum, would, when the meter is completely put together, always be in sight. The manufacturer would construct great numbers of these counting-boxes, and would send them to the inspector for verification at his leisure, and would afterwards mount them successively on the successive meters which he constructed, and would then send each complete meter for the ordinary index-drum verification.

31. It is quite clear that there is no difficulty, either in legislation or in practice, in remedying the defect of the Act, and with such remedy, the provisions of the Act for testing gas-meters would be made, perhaps, as nearly perfect as is possible.

32. I proceed with my fifth and final head:—

"On the general recommendations which appear to follow from these considerations."

33. It will, I think, have appeared with sufficient clearness from the statements which I have made, that Legislative amendment of, or addition to the existing Act is absolutely necessary. As all official regulation must be subordinate to enactment, I confine myself in the first instance to the points which ought, in my opinion, to be established by authority of Parliament.

34. The only point in the Act which I remark as possibly requiring amendment or explanation, is the form of phrase cited by me in paragraph 22; the necessity, or absence of necessity for which, I submit entirely to their Lordships' judgment. If, however, the Act leaves any doubt as to the stamping of gasholders for private persons and companies, it ought to be removed, as it is very desirable that manufacturers of gas and gas instruments should possess stamped gasholders. At the same time, it is proper for me to state that I have not thought myself competent to remark on any parts of the Act except those affecting the scientific or mechanical measures.

35. The equipment of the Exchequer Office appears to be sufficiently provided in the Act. The Lords Commissioners of Her Majesty's Treasury, I apprehend, are competent to lay down rules for the operations to be conducted in that office.

36. With regard to local offices, I do not think it necessary that they should be furnished with the weight, or cubic foot measure mentioned in paragraph 8, except as an absolutely last resource in case of deadly accident, and then the want of them can be supplied by immediate reference to the Exchequer Office. The only one which appears necessary is the copy of the gasholder, and even this will not be required if there is provision for passing an itinerant gasholder from the Exchequer.

But I think it indispensable that it be enacted that every local office be furnished with a gas-measurer, such as is described in paragraph 15 (A.), of capacity not less than five cubic feet, furnished with proper pipes, cocks, and other necessary apparatus, required in the testing of gas-meters, and having also conveniences for the supply of water and the control of its temperature, as well as of the temperature of the room. The use of a standard meter should be permitted. The decision on the adequacy of those equipments ought to be referred to an officer authorized for that purpose by the Lords Commissioners of Her Majesty's Treasury.

37. In regard to the preparation of meters for testing, I think it ought to be enacted that every meter must have its counting apparatus so constructed that either the whole can be seen, and its accuracy can be examined by the inspector (at the time of making the test by passage of air), on a principle equivalent to that described in paragraph 30, first suggestion; or that the correctness of the relation and connexion of the various parts of the counting apparatus can be verified and authenticated by stamp before the counting apparatus is affixed to the meter, on the principle of that described in paragraph 30, second suggestion.

And in regard to the operation of testing, I think it ought to be unequivocally laid down as a duty of the inspector, to examine the counting apparatus with reference to this required correctness, and to refuse his stamp unless the counting apparatus admit of examination, and be found correct. It is absolutely necessary that this enactment apply to the meters now in existence.

In regard to the method of stamping, I think it ought to be by impressing the stamp on a drop of hot solder, as is practised at all stamping stations, I believe, on the Continent.

The fees for stamping ought to be so divided between the examination of the counting apparatus, and the testing by passage of air, that it will be indifferent which of the principles mentioned above be adopted by the manufacturer. For meters in which it is necessary to unsolder and resolder the counter box, there ought to be an additional fee.

38. But as no Legislature can provide individually for every detail, I think it very desirable that general power be given by Act of Parliament to the Lords Commissioners of Her Majasty's Treasury, to issue instructions possessing the power of law, and to vary them from time to time, such instructions to apply only to equipment of the local offices, and to the operations for verifying their apparatus, and to the methods of examining meters, and to be in no way opposed to the words or spirit of the existing and the proposed Acts.

39. I also think it desirable that power be given to the Lords Commissioners of Her Majesty's Treasury to appoint an itinerant officer, who shall discharge in the local offices these duties of examination and stamping with the Exchequer stamp which are usually discharged in the Exchequer Office, and in particular the examination and stamping of the gas-measurers and standard meters; and who shall also have authority to carry out the instructions suggested in paragraph 38.

If no such officer be appointed, I think it will be necessary to use, for stamping the local gas-measurers and standard meters, a stamp differing both from the Exchequer stamp and the local stamp. But it appears difficult to define the authority under which this stamping can be done.

I terminate here my remarks on the legislative measures which appear necessary.

40. With regard to official proceedings under the existing Act, there appears to be only one requiring early action, namely, the appointment of a competent person to design and make, subject to the approval and by direction of their Lordships, stamps for stamping meters, as directed in section 3 of the Act. I beg leave to submit the name of Mr. E. W. Ladd, of 1, Old Jewry, as a person in whom this trust may be reposed.

All which I have the honour to submit to their Lordships' consideration.

I have, &c.,
(Signed) G. B. Airy.

George A. Hamilton, Esq., M.P., &c. &c. &c.
Secretary of the Treasury.

Exchequer, Feb. 17, 1860.

Sir,—I have the honour to return you Professor Airy's final report on the Sale of Gas Act, which you were so good as to place in my hands yesterday. That document appears to me to claim the early and very serious attention of the Lords of the Treasury.

Professor Airy's former letter on the same subject, dated 22nd October, 1859, contained, as you are aware, the following startling announcement of the inadequacy of the provisions of the Sale of Gas Act:—"After all is done," Professor Airy remarked, "there is a concealment in the mechanism of a meter which renders the verification as against intentional fraud entirely nugatory."

In my letter to you of the 26th October, 1859, I ventured to express my doubt how far it would be prudent to attempt carrying the Act into effect till some inquiry was made, in order to ascertain how far the serious imperfection announced by Professor Airy could be obviated or remedied. Since that date, much investigation has taken place, the result of which appears in Professor Airy's final report returned in this letter. I regret to say that I cannot consider it as satisfactory.

The apprehensions expressed by Professor Airy on the 22nd October, 1859, are not only repeated, but are made more extensive in their application. He describes the protection intended to be given by the Sale of Gas Bill, not only as "ineffectual against intentional fraud," his former statement, but as ineffectual also as against inaccuracy or mistake. His words, in his final report, are as follows:—"The door is left open to any amount of error, even to the effect of charging five times the quantity of gas really consumed, by an error, blunder, or of fraud in adjusting the train of wheels between the index-drum and the dials; and the Act of 21 and 22 Vict. is nugatory and useless. He illustrates this statement by a relation of facts given on his persoual responsibility demonstrating the conclusiveness of his assertion.

It appears that, in other countries, Belgium for instance, precautionary laws have been passed to guard against the dangers already described, but unfortunately no corresponding enactments have been introduced into the English Sale of Gas Act.

Is it not a matter of grave doubt how far that Act can be safely adopted for the regulation of a great trade, and how far it is justifiable to give it effect, without forewarning buyers and sellers of the imperfection of its enactments?

You will observe that Professor Airy, in addition to the instruments lodged at the Exchequer, namely, the weight, the measure, and the gasholder, suggests an additional machine called a gas-measurer, or as an alternative a gas-meter, as required by the inspectors in the local districts, for a test of the accuracy of the dials and indexes. It is also proposed that an itinerant officer of the Exchequer should be appointed to visit and inspect the gas-measurers (such officer being superior to the inspector), and who shall affix his seal to the gas-measurer when it is found to be correct. These additional precautionary measures are not provided for by the Sale of Gas Act. The introduction of the gas-measurer is admitted to be indispensable to secure the accuracy of the dials and indexes, which appears the main and essential object of the Act, but which object the framers of that Act appear to have overlooked or forgotten.

Professor Airy, in referring to this additional instrument, the gas measurer, states, that "the practical necessity of using one of these instruments seems to render it indispensable that they should be duly recognized in any legislation on the general subject." But it is not recognized, as suggested in the Sale of Gas Act, nor have any adequate steps been taken to my knowledge, to announce that such instruments are essentially needed by the trade. Certain it is that no steps have been taken, or are required by law to be taken, to verify their accuracy. How, then, can any real usefulness result from the Act in its present imperfect state?

The gas measurer (Report, s. 12), is described as an instrument which, from bulk, weight, and other causes, "cannot be brought for verification to the Exchequer," whilst it is admitted to be the instrument "on which the testing of every meter will depend. No provision is made by law to provide for the custody, use, or accuracy of this instrument on which the efficiency of the Act will depend. The delicacy of the instrument, and its liability to failure, are not denied by Professor Airy.

He very justly remarks (Report, s. 25), that the points to be ascertained before authenticating by the inspector's stamp, "the correctness of the meter, is to ascertain whether the series of figures presented by the three

indexes really indicate, with correctness, the number of cubic feet of gas which have passed through the meter." Without some effectual amendment of the law, it cannot be asserted that this object is, in any practical sense attained, and the whole operation becomes little more than a delusion.

It seems that Professor Airy considers that the local officers need not be furnished with copies either of the standard weight or standard measure deposited with me by the Treasury, as those instruments, he observes, "will only be required in case of a deadly accident," when the Exchequer standards themselves may be referred to. I presume, however that, if applied to by the public, I shall be bound to compare and verify those weights and measures, together with the gas-holders, brought for verification. Professor Airy adds, that it is "indispensable to pass an enactment requiring every local officer to be provided with a gas-measurer of capacity, not less than five feet." The construction of this instrument, its application, penalties against fraud, can only be enforced by the authority of Parliament. The direction to cover some of the machinery with glass so as to allow of inspection, and thus to detect inaccuracy and fraud, should be included in the same enactment.

It is true that, in order to escape the inconvenience of minute legislation, it is recommended in the enclosed report, that the Treasury should obtain a statutable authority for making regulations which shall have the authority of law. This is a suggestion which it behoves the Treasury carefully to consider. It is evident that the exercise of such authority will lead to an enormous mass of business and of correspondence on a subject which, heretofore, has never been connected with the duties of the supreme financial department of the State. Is it very certain that these functions should be cast on any of the great departments of the State, or will be well executed if so undertaken? If undertaken at all, they seem to me naturally to belong to the Board of Trade rather than to the Treasury.

I have, &c.

G. A. Hamilton, Esq., &c. &c. &c. (Signed) MONTEAGLE.
Comptroller-General.

PHŒNIX GASLIGHT AND COKE COMPANY.

The Half-Yearly Meeting of Proprietors was held at the Bridge House Hotel, Southwark, on Wednesday, Feb. 15—J. E. JOHNSON, Esq., in the chair.

The SECRETARY (Mr. Pridden) read the notice convening the present meeting, and the minutes of the last half-yearly and *pro formâ* meetings.

The following report of the directors, with the trade account for the half year, and balance-sheet at Christmas last, having been printed and circulated among the proprietors previous to the meeting, were taken as read:—

The directors submit to your consideration the trade account for the half year ending at Christmas last, together with the balance-sheet at that period.

Five small gasholders, at Wellington Street, have been renewed and doubled in capacity in the last half-year.

Notice has again been given of an application to Parliament for a bill to regulate the supply of gas within the metropolis. No bill has yet been introduced, but your directors, with the directors of other companies, thought it expedient to wait upon the Home Secretary on this subject; and they feel confident that, if a bill be introduced into Parliament, it will be fairly considered, and the result not likely to be destructive to the value of property invested in gas-works in the metropolis.

During the last half year, a net profit of £20,023. 10s. 9d. has been realized; out of which, the directors recommend that a dividend for the half year, at the rate of 7 per cent. per annum, together with a bonus of 10s. per cent. on the capital of the company, and the income-tax, or a total of £19,437. 11s., be now declared; leaving a sum of £585. 19s. 9d. to be added to the balance of £12,819. 11s. 1d., making a balance of £13,405. 10s. 10d. undivided.

Your directors have now to resign into your hands, in accordance with your Statute, the trust you have reposed in them during so many years; and they offer themseves for re-election, in the confident hope that their management will meet with your cordial approval.

Abstract of the Trade Account, for Six Months, ending Christmas, 1859.

Dr.			*Cr.*		
For coals used		£24,950 14 9	By rental for light		£61,941 0
Tradesmen's bills for materials supplied		6,939 15 4	Coke made for sale		11,123 3
Law expenses		7 9 0	Breeze, ditto		219 0
Retorts used		469 17 9	Tar, ditto		1,025 8
Meters—			Ammonia, ditto		1,005 15 1
Repairs	£ 702 8 7		Interest received		211 0 1
Fixing	642 0 0				
Depreciation	1,036 2 0				
		2,380 10 7			
Rent, rates, and taxes		2,092 7 8			
Directors, £750; auditors, £50		800 0 0			
Salaries		3,022 3 6			
Wages paid		9,791 18 4			
Bad debts and overcharges		309 6 7			
Investment-fund		500 0 0			
Reserve for depreciation on plant and leasehold property		4,237 15 0			
Net profit		20,023 10 9			
		£75,525 9 3			£75,525 9 3

Abstract of the Balance-Sheet, at Christmas, 1859.

Dr.			*Cr.*		
For capital of 9000 £60 shares, £52 each paid up		£468,000 0 0	By amount of plant at Midsummer last		£423,779 6 0
Unpaid dividends		264 16 3	Less—		
Unpaid tradesmen's bills, &c.		11,014 4 0	Reserve for depreciation of plant and leasehold property		4,237 15 0
Investment-fund		3,109 7 1			£419,541 11 0
Balance of profit and loss—			Add—		
Undivided balance	£12,819 11 1		Expended this half year in extension of works		2,160 15 0
Half year's profit	20,023 10 9				£421,702 6 0
	32,843 1 10		Securities for investment-fund		3,000 0 0
			Amount due from sundries—		
			Christmas quarter	£40,845 18 11	
			Arrears	2,223 2 8	
				43,069 1 7	
			Amount due for coke	2,739 5 10	
			Ditto breeze	114 10 0	
			Ditto tar	802 4 8	
			Ditto ammonia	661 16 5	
			Ditto sundries	1,147 1 3	
				5,464 18 2	
			Stock of coals	£8,503 10 0	
			Ditto coke	119 0 0	
			Ditto breeze	34 10 0	
			Ditto tar	168 7 0	
			Ditto ammonia	139 10 6	
			Ditto retorts	2,562 2 3	
			Ditto meters	14,647 3 0	
				26,194 2 9	
			Balance at treasurers'	£8,201 0 8	
			Ditto at interest	7,600 0 0	
				15,801 0 8	
		£515,231 9 2			£515,231 9 2

The CHAIRMAN: Gentlemen, it now becomes my duty to move the first resolution, which is of a formal character, viz., "That the report and accounts be received, and entered upon the minutes." In doing so, I shall have to detain you but a very short time indeed by any remarks with regard to the accounts. They are so similar to the accounts of the preceding half year, that probably everything which was said in respect to them, may be applied to those now before you. And yet the similarity is, indeed, more apparent than real; for though the amount of money expended for coals, tradesmen's bills, meters, rents, rates and taxes, very nearly approximates to that of last half year, those amounts, on the present occasion stand in relation to a larger quantity of coals, and, consequently, the rate per ton is somewhat less than it has been. The obvious result, as you will observe on the opposite side of the account, is, that the rental has considerably increased. It stands now at £61,941, as against £59,400; consequently, there is an increase of upwards of £2000. We are, therefore, enabled now to declare the same dividend as we did last half year, without being left in the position of being obliged, as we then did, to take a small sum from our surplus fund to make up the amount required. Indeed, we can now return that amount, and a little more, to the surplus fund, so as to be able, if necessary, to equalize future dividends. I do not know that there is anything in the accounts themselves that would justify me in detaining you with any lengthened remarks. I may say, however, in passing, that our bad debts have been reduced from 3¾d. to 2½d. per ton; and, considering the large amount of money received—something like £75,000 every half year—it does speak well for the officers who have to collect our revenue, that so small a sum as £309. 6s. 7d. should have to be written off as bad. Indeed, some of that is not to be regarded as money entirely lost, as a portion is due to overcharges and small deductions which we have thought it wise to make to our customers. I think this is the only point, with regard to the accounts. I have usually entered into statistics as to the quantity of coal, coke, tar, ammonia, and fuel; but I will not trouble you with them now, although I have them all here, except you desire it. Any questions upon them that the proprietors desire to put, I shall be most happy to answer to the best of my ability. There are one or two matters, however, which do deeply interest us, though they do not form matters of account, or belong to the private arrangements of this company, and to these I will briefly advert. During last year, an Act of Parliament was passed, for "regulating measures used in sales of gas." That Act was to have been brought into operation in a short time, but it depended upon the Government itself having lodged in the Exchequer certain instruments by which meters should be properly tested. Certain instruments have been prepared by some of the most scientific men of the day; and, when I tell you that Professor Airey has been engaged in the preparation of them, and has devoted a great deal of time to the subject, having visited our works as well as many others, and had before him many scientific persons, I think you will agree with me, that probably all has been done that could be done. But the instruments which have been lodged under his advice, are hardly those which gas-testers, as practical working men, could apply. They appear to be admirable instruments for testing a testing instrument, rather than instruments by which meters are to be tested; and I am afraid that, until something further is done on the part of the Exchequer, it will be difficult to bring the Act of Parliament into operation. In this district, it affects us very little indeed, inasmuch as we have always had at the expense of the companies, a place where meters could be tested; and it is very gratifying to know that the measure which the Government have authorized is precisely that which we have always been giving. There is another question, gentlemen, before the public, with regard to the consumption of gas, and that is a bill, not yet before Parliament, but proposed to be brought in, for the regulation of all gas matters in the metropolis. We are quite prepared to enter upon the inquiry which the introduction of such a measure will involve, and we have had an interview with the Secretary of

State upon the subject, who has expressed his anxiety that the matter should be brought to a satisfactory conclusion, and has most kindly offered to mediate, as far as practicable, between the contending parties. What the effect of that bill may be, we can form very little opinion upon. We have asked for a copy of it, but have been unable to get one. I am led to presume that the unwillingness to furnish us with a copy does not arise from any feeling of discourtesy towards us, but from the fact that the other side have not quite made up their minds upon the subject, and are as yet not quite prepared with their bill. If that be so, it is rather a surprising circumstance that a considerable number of vestries should have signed a petition in favour of the passing of a bill which is not yet prepared, certainly not yet before the House, and which, consequently, they cannot have seen. However, those who are acting on behalf of the gas companies are desirous to meet this question in a fair, manly, and honourable spirit; and, I dare say, they will take no advantage of any little things of this kind which are clearly irregularities, nor will they, without the bill be one of that seriously objectionable character that they cannot allow it to pass, avail themselves of the circumstance that it has not been lodged in time, nor put before the House in a proper manner. We wish to meet the thing fairly, believing that if we are met in the same spirit the result will be, that the measure adopted will be as much for the benefit of the manufacturers of gas as for the consumers of that article. There are, however, some of the clauses in that which the parties on the other side say is their ultimatum, to which we cannot agree. One of those clauses provides that the price of gas shall be reduced to 4s. per 1000 as a maximum charge. We may reduce it below 4s. if we please, but under no circumstance shall we charge more. Now, when we consider that we are lighting districts as far as Wandsworth, Battersea, Blackheath, and Lewisham—places which are of a rural, rather than an urban, character it will be seen that it is utterly impossible that we can consent to such an arrangement. And this is not all; there are other views of the case which render such an arrangement as to the maximum one which cannot fairly be entertained. We are dependant, I need hardly remind you, for the profit upon our returns upon the price of the material out of which we manufacture. If a strike should occur in the coal-fields, and coals become extraordinarily dear, although we cannot make gas for the price, yet we are to charge no more than 4s. Should war take place and all our coal ships be used for other purposes, or should be obliged to hide themselves in ports, and not attempt a voyage, or even if they had the free use of the sea, we know very well we should have to pay, perhaps, double price for our coals, and yet we are to be content with a 4s. maximum. In addition to this, the Chancellor of the Exchequer, in his wisdom, seems to think it right to double our income-tax, to make it 10d. instead of 5d. in the pound. All this has to come out of our profits before we can divide the results of our trading among our proprietors. Now, I have been taking out a few figures in order to show what would be the result of a 4s. price at this moment, when things are favourable, when freights are moderate, when the price of coals is low, when there are no strikes among the colliers, when our own men are behaving well, and the income-tax is not high. I find that, instead of the £18,000 which we are at liberty to distribute on this occasion, we should only have had £12,000, and that our dividends, instead of 4 per cent., including the bonus, would be reduced to 2½ per cent. Your maximum dividend, therefore, under the most favourable circumstances, would be at the rate of 5 per cent. I ask any commercial man, or any man connected with business or public concerns, whether 5 per cent. as a maximum, subject to all the losses which might come upon him by the contingencies that I have alluded to, is such a profit as would induce him to embark his capital in gas-works. I feel certain that no judicious man would do it, and that he would rather prefer investing in the Three-and-a-Half per Cents., with a certainty, than taking 5 per cent. as a profit on trading, with all the chances of loss which it involves. Then, too, we are threatened with a new light. There is the great lime-light scheme standing before the world at the present moment, by which it is proposed to supply light to the public at a much less cost than gas. About that, I beg leave to entertain an opinion very different indeed. I think it will be a much more expensive light; but the advocates of the scheme are entitled to their opinion, and I must give them leave to have their opinion, as I have one of my own. Still, there are those things constantly hanging over us, and should any invention turn up under which gas might be produced by some other means in a more economical manner, then your property would be seriously affected. Considering, therefore, all these circumstances, I think a very low rate of dividend ought not to be tolerated; and I cannot help believing that there are men of judgment and wisdom in the House of Commons who will see this, and will, in the passing of the proposed bill, give us that protection which we are entitled to ask. We desire no more than that we should have a fair and proper dividend for the capital which we have embarked, and we are quite willing and prepared to give to the consumers the protection to which the Legislature may think they are entitled. We have agreed to take the Gas Clauses Act at once, which limits us to a 10 per cent. dividend, and which provides that when the proprietors get that dividend, the surplus profits shall go towards a reduction of the price of gas. Under these circumstances, we should be glad to meet the consumers, and should be content to take even a less dividend than 10 per cent. if they could thereby be kept in a good humour. But, gentlemen, it is not entirely a question of price; there is another question of importance, and that is the purity of the article supplied. We have been giving a very high quality, and our consumers have got accustomed to that high quality; and I am perfectly certain that they would rather pay a fair price for a good article than a reduced price for one of inferior character. I cannot help fancying, however, that this bill will turn out eventually satisfactory to all parties; and I look forward to something like cheering prospects in the future. I am not intimidated by the strong statements which are sometimes made against us; I believe that gas affairs generally are in a very satisfactory state, and with regard to this company, I am sure they are such as must meet the approval of our proprietors. Holding myself ready to answer any questions which may be proposed to me, I will now move, "That the report and accounts be received, and entered on the minutes."

Mr. BECK seconded the motion. He said a better set of accounts he never saw than those now presented of the profit and loss of the past half year. It showed that there was the most efficient management of the company's affairs both by the directors, and the officers whom they employed. The coals used had cost, in round numbers, £25,000, and for that they had a rental of £62,000, or nearly £2. 10s. for every £1 expended. They had received for coke £11,123, as against £10,950 last year, which was more, he thought, than he had ever seen in any gas company's accounts—indeed, it was an extraordinary sum. They had also received, for tar and ammonia, a much larger sum than usual. Then, when he looked at the item, "Retorts used," only £469, and "Bad debts," only £309, he thought the meeting generally would agree with him, that it was one of the most favourable statements of accounts ever presented to a body of proprietors. He had, therefore, much pleasure in seconding the resolution.

Mr. RHODES hoped the directors had been able to effect an improvement with regard to the leakage at Blackheath and Greenwich.

The CHAIRMAN said he was happy to say they had done so. He could not say that they had no waste in that district, but it was much smaller in comparison to what it was. At one time, it was 33 per cent.; now it was very much under 20 per cent.

Mr. RHODES inquired at whose risk the transit of coals by sea was?

The CHAIRMAN said the company were their own insurers. At the instance of one of the directors, who was well experienced in the matter, they had had a return made of the amount that would have been charged if they had effected insurances out of doors, and they found that, during a long course of years, they had made money by the course they adopted.

Mr. RHODES further inquired, at whose risk the cheques sent to the proprietors in payment of their dividends was?

The CHAIRMAN said the company had a printed form of order, which the proprietors desiring their dividends sent by post filled up for the purpose; and only upon receiving such orders, which were given at the risk of the parties desiring it, were cheques sent.

Mr. BOX inquired the per centage of gas waste at Greenwich up to the time of making up the accounts, estimated at 9500 feet per ton?

The CHAIRMAN said they could not estimate the make at 9500 feet per ton, as it was a quantity they did not realize; but taking it at 9400, the waste at Greenwich was 17 per cent. Taking it at 9000 feet, which was the figure that he formerly adopted, and believing that that was somewhat nearer the quantity as consumed at the consumer's burner, it would be only 12½, allowing 1½ for the consumption of the company upon their own works. This was a little less than in London, where it was 14 per cent. Taking the whole of their districts together, it was about 14½ per cent.

Mr. BOX said the chairman and he came very near together. He had not made his calculations upon the basis of a station-meter, but upon the basis of the consumers' meters, which he thought was the better plan, as the company received their rental on that basis. In this way, he made the actual and positive loss at Greenwich 18·4 per cent., as against 18·34 last year; and at Bankside and Vauxhall it was nearly 19 per cent. It had never been so low before, and, taking the whole condition of the company's affairs into account, he thought they had never been in so favourable a state as at present. He, therefore, congratulated the directors and the proprietors upon the circumstance, and hoped the prosperity they now possessed would be continued.

Mr. GRAY said the meeting had two causes for congratulation—one, the satisfactory working of the company during the last half year, and the other, that Mr. Box had been disarmed of all power to prolong their discussions. The latter was a feature which he thought very highly of, because on many former occasions, Mr. Box had gone, as they believed, too minutely into matters of detail, and did not always arrive at right conclusions. Now it appeared, however, that the directors and he were perfectly agreed; and it must be satisfactory to all persons interested in the company to witness the prosperous state in which their affairs had been placed. With respect to what might arise hereafter, he (Mr. Gray) did not anticipate there was much to disquiet them. His good friend, the chairman, had alluded to some great discovery by which gas was to be superseded. Well, if there was such a prospect, so much greater was the need that the proprietors of gas property should have their 10 per cent. dividends, and not only that, but something beyond, to recoup them for the capital invested in such undertakings. He confessed, however, that he was very suspicious about these new discoveries, of which they so frequently heard, especially when the parties seeking to bring them before the public stipulated for payment before they were found to be successful in practice. He had no doubt the chairman was familiar as he was with offers from persons who were ready to introduce some valuable invention which should be of immense value to the company. He had always met such propositions with the remark—"Show me that it will be useful, and can be brought into operation, and afterwards you shall be liberally rewarded;" and the result was he had never seen the parties afterwards. With regard to the agitation now going on in the metropolis, he had no fear; he only regretted that a few men should be able to exercise such an influence over the public mind. The course taken by the companies was quite consistent with common sense and fairness. He believed there was not one company in London, which was not prepared and ready to meet the consumers, and give them all that could reasonably be asked at their hands. All that they required was, that the demands should be reasonable, and such as upright and honest men could entertain. Unfortunately, that was not the position of things at present, but he still hoped that some amicable arrangement would be come to, as it was very undesirable that the companies should be at variance with their customers. It was of the utmost importance that there should be no cause of dissatisfaction on the part of the consumers; but then, as it had been well said by the chairman, the companies had a just right to expect that, while they were supplying an article of good quality, they should receive such a price for it as would pay them a fair profit on their capital. It was absurd to talk of fixing a maximum price for an article, the cost of manufacturing which depended upon the price of materials which were always fluctuating in value. If a low maximum were fixed, the companies ought to have the right of refusing to supply at that price, otherwise the maximum should be such as would adequately remunerate them. He would add, in conclusion, that he cordially agreed in the observations which had been made as to the efficient management of the affairs of this company.

Mr. APSLEY PELLATT, referring to the remarks made as to the leakage at Greenwich in past times, said it should be remembered that the pipes then were in a very bad condition, and the company were not in a position to replace them. Now he was upon his legs, he might refer to one of those fallacies which were so rife out of doors. He held in his hand a statement, wherein it was said that, from a list of towns in which low prices for gas prevailed, it was found that at Whitehaven the maximum price was 2s. 6d., and the minimum 2s. per 1000; while at Liverpool there was a uniform rate of 3s. 9d., and at Birmingham 3s. and 4s. were charged. This apparent anomaly, it was represented, was demonstrated by the fact that, where coals were dear, the products over and above the gas itself varied in a corresponding ratio; but, from the accounts of the companies, it was shown that, of the gross cost of the coal required for making gas, the whole was returned again except 10d. in the shape of coke, tar, naphtha, proving that the gas costs one-sixth less than 1s. per 1000 feet even in the metropolis. This, it was said, showed that the price of coal could only influence the price of gas to the extent to which this 10d. could be reduced. Now the real fact was, that if they went to Whitehaven to buy coals they would pay 7s. per ton, whereas, in London, they must pay 14s. The difference between the two was 7s., and the reduced amount, taking half the materials as replaced, was 3s. 6d., and this sum added to the 2s. 6d. brought the price up to 6s., so that, upon the reasoning of these parties themselves, they had little to complain of. It was a great pity that such statements, as the one he had referred to, should get into the public papers, but he felt quite sure that the companies had only to persevere in the same course of integrity which had all along marked their conduct. He believed that, when the right time came, and the price of coals was again reduced to what it was in 1851, this company would be prepared to redeem their pledge of reducing the price of gas to what it was then.

Mr. BENTLEY expressed the great satisfaction with which he had gone through the accounts of the company. He had attended many meetings, and had gone through many statements of account, but on no occasion with more pleasure than on the present. He must also congratulate the meeting upon the fact that Mr. Box. who for many years had always been able to detect something which needed amendment, was reduced now to base his remarks uron some decimal fraction in a calculation upon the comparative loss of gas by leakage. As to the observations from the chair upon the proposal to regulate the price of gas, he thought the companies might very properly say that they were prepared to charge a certain sum, so long as the cost of the materials from which they manufactured gas remained at a certain price, and if those materials were reduced in price, they would make a corresponding reduction in the cost of gas. Surely, that was a proposition which no reasonable man could oppose.

The CHAIRMAN, in putting the resolution to the meeting, said he would make one remark in reference to the statements which appeared at times in the public journals. He believed the Phœnix Company were the first which allowed reporters to be present at their meetings; and it was a singular circumstance that, from that moment, the prosperity of the company commenced. He did not mean to say that their prosperity was the result, but he had no hesitation in saying that the circumstance of their reports and accounts going before the world, and an opportunity being afforded for the public to judge of the way in which their concerns were conducted, gave confidence to their proprietors. And, although it was possible that a certain amount of error was from time to time circulated, and fallacies such as those which his honourable colleague had alluded to were spread abroad, the circumstance of their being printed gave facilities for, and necessarily led to, their correction. His friend had corrected one to-day; and, no doubt, this fact would show, to those who made strong statements, that they could not do so with impunity, because there was sure to be a reply to them. He could only say, for himself, that he believed only good results had arisen from having their proceedings reported; and he should be sorry to see the day—in fact, the day had gone by—when they could conduct their affairs without the advantage of publicity. As to the gas supplied by this company, they had taken care to have it always of a good quality, while they had been giving to their proprietors an increased dividend. Although they had not felt that that increase was such as would justify a diminution in the charge for gas, they had felt it a duty incumbent upon them to give their consumers a better quality. He might also state, that they had had at every one of their stations—at Greenwich, at Bankside, and at Vauxhall—provided accurate and philosophical tests for testing the quality of the gas supplied by them; and he now publicly offered those tests to any scientific person in the districts, who thought proper to use those instruments to ascertain the quality for themselves at any time. He gave this as a cordial invitation; and, with these remarks, would submit the resolution for adoption.

The motion was put and carried unanimously.

Mr. GIBBES, the deputy-chairman, said, on these occasions it was only usual to submit two resolutions for adoption; the first was the reception of the report, which had been to-day received in so complimentary a way to the directors, and by which he was extremely gratified; the second was that which generally fell to his lot—namely, to propose the dividend. If anything could induce him to submit that resolution with but few comments, it would be the fact that their worthy auditor, who had generally taken the directors to task for some supposed duty unfulfilled, had found nothing on this occasion to detain the meeting for. The fact was, ever since Mr. Box had been an auditor, he had gradually become more and more satisfied, until now he seemed as thoroughly well pleased as any other proprietor in the concern. He (Mr. Gibbes) would not touch upon any of the subjects alluded to so well by the chairman, but would merely add that any credit which was due for the improved state of affairs belonged not to the directors alone. They had the satisfaction of possessing a body of officers of whom they might well be proud. In the first place, there was the engineer, who in talent stood second to none in London; they had also a secretary, who was most intelligent, industrious, and useful, in every matter which came within his department; and a cashier, who had thousands upon thousands of pounds entrusted to him, and whose accounts were always free from anything like mistake. He felt that he should be lacking in duty if he did not bear his humble testimony to the value of those officers, and did not give them the merit of contributing largely to the prosperity of the company's affairs. He had now to propose, "That a dividend for the half year ending Christmas last be now declared upon the capital of the company, out of the profits of the undertaking, at and after the rate of 7 per cent., together with a bonus of 10s. per share, free of income-tax, and that the same be payable immediately after the business of the meeting has terminated, and afterwards at the company's office, at Bankside, on Thursday, the 16th instant, and also on Monday, the 20th instant, on both days from the hour of twelve till three, and from that time on Wednesdays only, from two till four o'clock."

Mr. RHODES seconded the motion, which was carried unanimously.

The CHAIRMAN said the duty of the directors elected this time last year had now been fulfilled, and, in resigning the trust reposed in them, they had to thank the proprietors for the very cordial support they had at all times given to the board, and for the very gratifying manner in which they had this day received the report and accounts which had been presented.

The CHAIRMAN having vacated his seat, Mr. Gray was called upon to preside, *pro tem.*

Mr. BENTLEY proposed a vote of thanks to the late board of directors, and repeated the assurance of the pleasure he felt in witnessing the prosperity of the company under their able management.

Mr. RHODES seconded the motion, which was very cordially adopted.

Mr. JOHNSON returned thanks for himself and colleagues.

A PROPRIETOR thought the meeting should express, by a cordial vote, their approbation of the conduct of their officers, and a resolution to that effect was unanimously agreed to.

The SECRETARY said, on behalf of the officers of the company, who were a numerous body, he had to acknowledge the compliment just paid to them. On a previous occasion, they had received a similar proof of the kindness and consideration of the proprietors; and he could only assure them that it stimulated their officers to use their utmost exertions to secure the prosperity of the company. He was bound also to say that, within the last month, the directors had been extremely liberal to their officers, whose energies would, in future, be as fully devoted as ever to the interests of the company.

A vote of thanks to the auditors was also adopted and suitably acknowledged by Mr. Bailey and Mr. Box, the latter gentleman taking the opportunity of referring in eulogistic terms to the manner in which Mr. Burslem, the officer appointed to attend the auditors, discharged his duty.

The SECRETARY having read the section of the company's Act referring to the election of directors and their qualification for office,

The retiring directors, Mr. John. E. Johnson, Mr. E Horner, Mr. J. A. T. Smith, Mr. Robert Forrest, Mr. R. Fall, Mr. Thomas Gibbes, Mr. H. Tudor, Mr. Apsley Pellatt, Mr. William Joshua Tilley, and Mr. Boyson, were re-elected; and Mr. Johnson appointed chairman, and Mr. Gibbes deputy-chairman of the company for the ensuing year.

Mr. J. C. Bailey and Mr. Joseph Box were re-appointed auditors.

The CHAIRMAN thanked the proprietors for the renewal of their confidence, and the proceedings terminated.

EUROPEAN GAS COMPANY (LIMITED).

An Extraordinary Half-Yearly General Meeting of this Company was held on Wednesday, Feb. 15, at the new Offices of the Company, 4, Frederick's Place, Old Jewry—SHEFFIELD NEAVE, Esq., the chairman of the company, presiding.

The SECRETARY having read the notice convening the meeting, the minutes of the last general meeting were read and confirmed.

The directors' report, of which the following are the principal passages, was also read:—

Gentlemen,—Your directors have to report that, in conformity with the resolutions of the extraordinary general meeting held on the 27th of July last, they took immediate steps to register the company under the Limited Liability Acts, and on the 4th of August last it was incorporated under the name of "The European Gas Company (Limited)." The forms for registration, books, share certificates, and other documents, have been adapted so as to comply with the provisions of the Acts of Parliament for the government of joint-stock companies. Neither those Acts, nor the regulations of the company, require the holding of a half-yearly meeting; but your directors have considered it the wish of the proprietors that they should not deviate from the course adopted for some years past, of calling the shareholders together at this season, although they are unable to submit a statement of accounts until the usual period after the termination of the financial year. They therefore confine themselves, as on former occasions, to a general report of progress made since the annual meeting.

Amiens.—Increase of lights, 415. It will be seen that the demand for new lights in this town steadily continues; even during the winter of 1858-59, it had reached a point which rendered the means of distribution of gas inadequate for the supply, without having recourse to excessive pressure. In order to remedy this evil, a new leading main, 12¾ English inches in diameter, and about 800 yards in length, has been laid. Owing to the number of bridges in this distance, the outlay has been considerable; but the results have been satisfactory, inasmuch as gas is now supplied freely at every burner with diminished pressure, and, consequently, with less leakage than formerly. It was perceived that the distant situation of the works, which are in a suburb of Amiens, had, in some cases, had a prejudicial effect as regards the sale of coke by retail, as also with respect to the sale of fittings. The personal investigations of your directors having satisfied them on this point, they gave instructions for the opening of a shop in one of the most frequented parts of the town. This was done in November last, and although the time that has elapsed is short, it is gratifying to state that the amount of sales thereby effected has exceeded their expectations.

Boulogne.—Increase of lights, 411. The bathing season passed away without any renewal of activity in this town, and your directors were apprehensive that no early recovery from the unfavourable returns of last year would have taken place, but the accounts received for the quarter ended on the 31st of December give proof of a gradual improvement, which is both satisfactory as regards the present year, and justifies more confident hopes for the future. Your directors have never ceased to stimulate the agents of the company to energetic action, nor have they spared their own personal exertions on the spot in endeavouring to improve this portion of your property. A new church has been fitted with burners by this company. This is the first church in Boulogne in which gas has been introduced, and experience in other places shows that its application to the lighting of churches in a French provincial town soon leads to its more general adoption by the surrounding shopkeepers and other residents of the place. The new theatre is nearly finished, and will probably be opened in October next. This will give some animation to the town, and tend to keep shops open until a later hour in the evening than is now customary. Thus the company's business will be benefited in various ways.

Caen.—Increase of lights, 349. The rapid increase of consumption here had completely overtaken the means of manufacture and supply. Alterations on such a scale, as in some measure to transform the works, have been carried out during the summer and autumn. The single gasholder has been telescoped, the retort-house enlarged, additional coal-stores erected, and the superintendent's lodging converted for other purposes, so as to provide for the exigencies of the case. Accommodation for the superintendent has been provided on another portion of the company's property. The old 8-inch leading main had become insufficient for the supply of the whole town. Your directors have replaced it by a new main, 12¾ English inches in diameter, and about 1100 yards in length. The 8-inch main taken up has been laid in the principal street, the Rue St. Jean, so as to feed the branches and services on one side of the street, whilst the pipe of 6-inches in diameter still remains to provide for the other side and its outlets. In the course of two years it will be necessary to build a third gasholder, to erect new coal-stores, and further to extend the retort-house. The expense will be brought within the narrowest possible limits, but under any circumstances the outlay must be considerable.

Havre and St. Adresse.—Increase of lights, 600. The decision of the Council of State has been in favour of the establishment of gas-works on the land purchased for that purpose by the company in 1858. The Emperor of the French having ratified this decision on the 26th of January last, your directors have devoted their earnest attention to the measures most expedient for carrying out that clause of their treaty with the town of Havre which binds the company to remove the manufacturing part of their works from the present site to some other suitable place. The outlay required for this object will commence almost immediately.

Nantes.—Increase of lights, 1263. It will be observed that the highly favourable rate of increase, which afforded subject for congratulation at the last annual meeting, has been fully maintained since that time. Gas has been introduced into several important buildings, and is now coming gradually into use in large establishments and private houses for purposes of cooking and heating. It is anticipated that, during the present year, business in this town will be more than usually active. The local authorities are promoting a national industrial exhibition on a large scale to be held at Nantes. It is intended that the proposed exhibition shall remain open for some months. It will, there is every reason to expect, attract many thousands of visitors, and this cannot fail to prove advantageous to the interests of the company. Your directors have carried out the extension mentioned in their last report, and the manufacturing power has been increased 50 per cent. by the addition of a new building to the retort-house.

Rouen and Sotteville.—Increase of lights, 749. It must be borne in mind that the reduction of price (equal to 16 per cent.), by means of which the concession for 50 years was obtained, came into operation on the 1st of January, 1859. In the mean time, the increase of business has been very large, but the price at which the gas has been supplied to the whole of the town cannot, of course, in the first instance, be expected to admit of equally profitable returns as those obtained last year. The local exhibition of manufacturers, which has been open for several months in this town, is considered to have been very successful. It has occasioned a considerable accession of temporary business at this station, and your directors have no reason, on the whole, to be dissatisfied with the returns they have received up to the present time. The district of Sotteville being situated at the extremity of the line of mains from which the numerous factories lighted by this company are supplied, it was occasionally found difficult, with existing pipes, to provide adequately for the increasing demand. Your directors have, therefore, decided to lay a large main for some distance, and the effect will probably be to meet every requirement likely to arise in future from this district. It was, for a length of time, a subject of regret that the gas-fitting business in the town was, for the greater part, in the hands of incompetent workmen, who charged an exhorbitant price for every article sold. It was but too evident that this acted as a check on the extension of the use of gas. These men, though they could not command any great amount of influence, had it in their power, if interfered with, by clamour and importunity with the authorities, to have raised obstructions to the amicable settlement of the concession recently obtained. Your directors therefore waited till the contemplated treaty had been duly ratified, when measures were taken to commence the manufacture and sale of fittings. This decision has been received with satisfaction by many of the inhabitants; and the complete success which has attended this new branch of business so established evidently shows that the step is a judicious one.

General increase of light, 4687. Although the prosperity now enjoyed by the company has not met with any serious interruptions, it has not been without some drawbacks during the nine months since the 31st of March last. Coal freights to France were high during part of the year, and the demand for coke has hardly increased in the same proportion as the rapid supply. The winter, also, has been somewhat unfavourable. In consequence of the wet weather which has unfortunately prevailed during the months of the greatest consumption, the streets have been deserted nearly every evening; tradesmen have used gas very economically, and have closed their shops unusually early. But, notwithstanding the prejudicial effect thus produced, and the reduction of price at Rouen, it is most satisfactory to report that the aggregate gross rental for the nine months ended the 31st of December last shows an increase of £2851 over that of the corresponding period in 1858.

The rapid growth of the company's business has necessitated a large outlay for extensions and enlargements, for which the amount annually reserved for depreciation and redemption, but for the present made available as capital, has become insufficient. Your directors have exercised, to the extent of £4000, the powers conferred upon them by the regulations of the company to raise capital on loan. They have succeeded in borrowing this sum at 5 per cent. per annum, on security of the property at Nantes. They well considered this subject, and it was after due deliberation that they deemed it preferable to obtain the money in France. The outlay impending at Caen, Havre, and Rouen, will render it needful to raise further capital in the course of a few months. Your directors have throughout contemplated these measures, but have deferred them as long as possible, and they have frequently called your attention to the subject since they obtained the first of those treaties, which are now completed, and have secured to the company the exclusive privilege of supplying gas to the different towns during various periods, and four of which extend to fifty years. The commercial treaty to be concluded with France will cause a reduction of 1s. 5d. per ton in the cost of coals delivered in that country, unless there should be some rise in freights. This treaty will, no doubt, occasion great activity in several, if not all, of the towns lighted by this company, and the consumption of gas will necessarily increase in proportion. A half-yearly dividend, at the rate of 6 per cent. per annum, was made payable to the shareholders on the 1st instant, by means of warrants—this mode of effecting the payment being considered preferable to the plan hitherto adopted, both as regards security and saving of time and trouble to the shareholders. It is satisfactory to learn that the alteration has met with general approval.

The CHAIRMAN said: Gentlemen,—I have very little to add to the report that has been read, which, it being the portion of the year at which we make up our accounts, confines itself to the details of what has been done at our various stations since we last had the pleasure of meeting you. I may say that the report fully bears out the anticipations which we ventured to express to you, that we should have a great increase of business follow the reduction in the price of our gas; and which was, indeed, the great groundwork upon which we came to the decision to submit to what were considered onerous conditions, though the result has proved most advantageous. Our business is increasing—we have had an increased number of lights during the past half year—and another gratifying feature is, that there seems a taste arising, in every direction, to use gas for both cooking and lighting. The increase in the number of lights, however, must not be taken as the exact measure of profit for the year; because some private persons and shopkeepers have put lights in rooms and different shops, not for the purpose necessarily of every day use, but for use occasionally. But each increase of light, in reality, begets a further increase; for this lighting in France seems to be regarded as a luxury, and, like some other appetites, it grows upon what it feeds on. Each person, seeing a light near him, is induced to have a light himself. But, whether that be the cause or not, it is clearly very much for our benefit; and we are obtaining at all these stations a very great increase of business. I am glad to be able to point to that, because it will be remembered how frequently we have laid great stress upon that point in stating to you the advantages and disadvantages of the different concessions. I do not know that there is any particular remark to be made with regard to any station in particular, except Havre. There we are in a position requiring us immediately to commence the movement of our works to another point; and the report mentions that we are compelled to have them finished by the 31st of December, as regards the retorts; but, owing to the length of time which has been occupied in obtaining the concession, through no fault of ours, we consider we ought, and we believe we shall, obtain a further extension of time. We have made all the necessary provisions for the purpose; so that we have only now got to begin the work. We have purchased the land, got it conveyed to us, and it has been agreed to as the site of the works. (Hear, hear.) The next point to which I should call your attention is the subject of finance. We have told you at several meetings that we should require to make an outlay to carry out the provisions of these treaties, and for that purpose we should, of course, be compelled to raise more money. It was with that object that we came to you for powers, which you gave us long since, but which we have been enabled, by recourse to those funds which we appropriate for redemption and depreciation, to defer the exercise of. That, I think you will admit, is a good financial operation, enabling us to borrow our own money at a much cheaper rate than we could obtain elsewhere. We shall have occasion, I think, this year, to raise money to the extent of £9000 or £10,000 under the powers which you have already given us. Under those powers, we are in a position to raise £50,000, but not more than £20,000 without previously coming to you. I do not contemplate that we shall be obliged to raise the whole, but I anticipate no difficulty in raising what we require, because we shall only want to raise it for three, or four, or five years. We shall not for a moment propose to you to issue shares, because that would be an extravagant mode of raising money for so short a period as we shall require it. (Hear, hear.)

Mr. W. J. LEWIS: I presume you would raise this money by debentures?

The CHAIRMAN: I suppose so.

Mr. LEWIS: They would be first offered to your own shareholders, I presume.

The CHAIRMAN: Yes, of course, guided by the price of money at the time. It will require consideration. We shall send circulars to the proprietors; and, from what we have heard, there will be no difficulty about it.

Mr. LEWIS: What will the security consist of?

The CHAIRMAN: The security will be a first charge upon our works in France.

Mr. LEWIS: Will the loan be for any fixed time?

The CHAIRMAN: Yes, for two, three, or five years; just as may be convenient.

Mr. ALLAN: Convenient to the directors?

The CHAIRMAN: We shall endeavour to accommodate those who lend.

Mr. ALLAN: Do you contemplate raising further sums after that?

The CHAIRMAN: I do not like to bind myself to figures upon such a point, but I think about £10,000 the first year, and £6000 the second.

Mr. FAWCETT: Sir, I will suggest something which I think you will consider practicable with reference to this matter. It has been suggested that these loans should be offered to the present shareholders, That is very pretty in theory, but in practice it is exceedingly inconvenient. Our capital is about £240,000, and we must all have this offered to us. The whole sum that is required is so very small, that I would suggest the directors should deal with this in the best way they can, and raise the money at the cheapest rate they can, irrespective of the proprietors. It would make a great deal of work of a very small matter.

The CHAIRMAN: I am much obliged to you for the suggestion. We shall issue circulars to the shareholders, and take care that their interests are not lost sight of. They will, after receiving a notice, stating that we are going to raise the money, exercise their discretion as to applying for it.

Mr. FAWCETT: There can be no objection to that.

Mr. LEWIS: I think the option ought to be given to the shareholders.

Mr. FAWCETT: There can be no objection to the shareholders lending money to the company, if they do it as advantageously as it can be done otherwise; but, if the company cannot raise this money as well from the shareholders as from other parties, they ought to go to other parties.

The CHAIRMAN: We will take care that the shareholders have due notice. It perhaps will make the matter clearer to the proprietors if I mention that the total sum we contemplate laying out is about £32,000. We should in two years raise about £16,000, and, after that, what is set aside for depreciation and redemption will be sufficient, not only to cover the small outlay that remains, but in five years will repay the whole of the expenditure.

Mr. BROWN (a director): Were it not for the redemption-fund, we should require about £32,000, but we have £18,000 or £19,000, which we can use as working capital; and this will pay us better than investing it at 3 or 4 per cent.

The CHAIRMAN then moved the adoption of the report.

Mr. FAWCETT seconded the motion, which passed unanimously, as also votes of thanks to the chairman and directors, and to Mr. Backler, the secretary, which were suitably acknowledged.

RATCLIFF GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Proprietors of this Company was held on Thursday last, at the London Tavern—J. G. HAMMACK, Esq., Chairman of the Board, presiding.

The SECRETARY having read the notice convening the meeting, the corporate seal of the company was affixed to the register of proprietors, and

The CHAIRMAN read the following report and account:—

Gentlemen,—The directors experience much pleasure in meeting this half-yearly assembly, pursuant to the Act of Parliament. The accounts have been carefully examined by the board and auditors, and the result shows, after payment of a dividend at 5 per cent. per annum, and a bonus of 2s. 6d. per share, free of income-tax, and payable this day, there will remain the sum of £1069. 19s. 2d. to be carried to the credit of profit and loss. The increased rental affords them much satisfaction, coupled with the knowledge that an ample and most efficient supply of gas has been distributed throughout the district during the winter months, by day and night, without a complaint from renters or parochial boards. The new retort-house is complete, and ready for action when required. An addition to the company's freehold property has been recently made contiguous to the works, and upon the land houses will be erected, to be occupied at a rental by the company's workmen. The election of three directors and one auditor, who retire by efflux of time, but who, being duly qualified, offer themselves for re-election, and also the declaration of a dividend, form the business of the present meeting.

Dr.				*Cr.*			
To stock	£ 200	0	0	By cash—			
Trade charges	1,404	18	9	Taxes	£ 140	10	5
Petty charges	81	4	0	Sundries	48	6	8
Interest on loans	323	8	8	Light	13,699	12	2
Tradesmen's accounts	234	14	8	Coke	2,730	15	6
Wages	2,369	17	5	Liquor	70	0	0
Coal	6,839	14	5				
Retorts	264	17	5				
Rent and taxes	358	5	6				
Direction	275	0	0				
Auditors	10	0	0				
Salaries	585	7	10				
Bad debts	41	16	11				
Profit and loss	3,694	19	2				
	£16,689	4	9		£16,689	4	9
				Profit and loss	£3,694	19	2
				Undivided balance	1,273	2	8
				Divisible	£4,968	1	10

The CHAIRMAN then said that the business of the half-year had proceeded very steadily, and no circumstances had arisen to call for any lengthened remarks from him. He would merely refer to a fact stated in the report, that the new retort-house had been completed, and was ready for use; so that the company was in a condition to meet any demands that were likely to be made upon them for gas. (Hear, hear.) It was a gratifying circumstance to notice that the gas supplied from the works gave general satisfaction, so that complaints were almost unknown; but, if made, they met with immediate attention. (Hear, hear.) As an opportunity had offered to add to the company's freeholds with advantage, some property contiguous to the works had been purchased, which, it was believed, would prove highly beneficial to the company.

The report was unanimously adopted.

Upon the motion of Mr. GOODHART, the retiring directors were unanimously re-elected.

Mr. C. T. TAYLOR was also unanimously re-elected an auditor of the company, and a vote of thanks to the directors closed the proceedings.

THE METROPOLITAN GAS SUPPLY

WESTMINSTER DISTRICT BOARD OF WORKS.

A Special Meeting of the Board was convened at the Office, Great Smith Street, on Friday, the 17th inst., pursuant to a requisition signed by the following members, viz., Messrs. Hughes, Clarke, Deakin, Hartley, and Godson, "to draw a cheque for £90, in pursuance of, and to carry into effect the resolution of, the board on Friday, the 10th instant, namely, 'that the next board be made special, to sign a cheque for £90 voted by this board on the 13th day of January last, towards the expense of the gas inquiry, and that the treasurer be authorized to pay such cheque, upon the signature of any three members present at such meeting, countersigned by the clerk.'"

Mr. EDGAR HORNE was called to the chair, and commenced the proceedings by reading the requisition.

Mr. GODSON then moved, "That a cheque for £90 be now signed by three members of this board, pursuant to the resolution of the board of the 13th of January last and the 10th of February instant, towards the expenses of the gas inquiry, and that the treasurer be authorized to pay such cheque upon the signature of such members, countersigned by the clerk." He believed that the question of the metropolitan gas supply, and of the contribution of this board towards it, had been so thoroughly ventilated, and that all that could be said for and against it had been so well said, as to render it unnecessary that he should take up time with any remarks on the pre-

sent occasion. He submitted that the board had not now met to discuss the question, but to perform a specific duty. He had been told that it was intended to call for a division upon the vote; but after the resolution of the last meeting of the board, he doubted whether there was any authority for such a course.

Mr. DEAKIN seconded the motion.

The CHAIRMAN: Will the mover of the resolution undertake that himself, and two other members will sign the cheque if the motion is adopted? If not, it is useless to go on with the discussion.

Mr. GODSON replied that he was ready to do so.

Mr. TODD said, before the board could sign the cheque, they must abolish the functions of the finance committee, as by their bye-laws they had delegated the power to sign cheques to that committee. Therefore, however willing gentlemen might be to undertake that duty, there was something else to be done previously.

Mr. T. HORN said the board had evidently been summoned to set aside a bye-law, and, no doubt, to rescind a resolution. That being the case, the notice was informal.

The CHAIRMAN (who is a member of the finance committee) said he did not consider that the bye-law, authorizing the committee to sign cheques, rendered the board incapable of doing so if necessary.

Mr. TODD said the objection which he intended to raise was, that the summons was incorrect. The board must, first of all, be specially convened to rescind the bye-law before they could take action in the way of signing a cheque.

Mr. T. HORN thought there could be no doubt of that fact. They were asked by the terms of the motion to rescind a resolution making the bye-law, and, what was still worse, for the whole and sole purpose of doing an illegal act. The chairman would presently tell them that, before a resolution of the board could be rescinded, there must be one-fifth more members present than when the bye-law was made, or that it would require a majority of two-thirds of the board to rescind the resolution. Whichever way it was, let it be understood that a division would take place, that the name of every member voting for the motion now before them would be recorded upon the minutes, and that, if carried, and the money paid, it would subsequently have to be refunded. He appealed to the solicitor for an opinion on the subject.

Mr. ROGERS said no doubt the board could rescind a resolution, and set aside a bye-law, provided they were specially convened for the purpose. The 57th section of the Metropolis Local Management Act enacted that resolutions of boards and vestries should not be revoked or altered except at a meeting specially convened for the purpose, and by certain majorities therein specified. This board could not sign a cheque unless specially summoned to revoke or suspend the bye-law under which the power to sign was delegated to the finance committee.

The CHAIRMAN differed from the solicitor, and expressed his opinion that, though the board had, for convenience' sake, authorized the finance committee to sign cheques, they still reserved their own right and power to do it. His opinion, however, must be overruled by that of their legal adviser.

Mr. ROGERS said he was afraid that, if the objection was persisted in, it was fatal to the notice convening the present meeting. At the discussion on the bye-laws, pretty nearly every member of the board was present, and therefore it was not probable they could now get a sufficient majority to rescind one of them.

Mr. DEAKIN was surprised to learn that the board had abnegated their power to sign cheques, because, for their own convenience, they had authorized the committee to act for them in that matter.

Mr. ROGERS reminded the board that this question was discussed at the last meeting, when it was decided that such was the case, and that, if they wished to resume that power, it must be by convening a special meeting, to revoke the authority given to the finance committee. The only question now was, whether they were legally summoned for such a purpose, a technical objection having been raised as to the form of that summons.

Mr. NORRIS hoped that that objection would be a fatal one.

Mr. TODD said, if the board should attempt to set aside a bye-law under the present notice of meeting, those members who were not in attendance would have good right to complain.

Mr. T. HORN supported the technical objection, though he believed that if it were over-ruled, the motion before the chair would be defeated on the merits.

Mr. DEAKIN inquired whether the clerk had consulted the solicitor as to the form of summons?

Mr. JEBB said, in all cases where he deemed it necessary he consulted, and was happy to act on the opinion of the solicitor; but this was not a case in which he deemed it necessary to ask the solicitor's advice. He had summoned the board in the terms of the requisition.

Mr. AUSTIN thought they knew quite enough of the merits, or rather the demerits, of the question to justify them in not standing on technicalities.

After some further conversation,

The CHAIRMAN said he would much rather the matter were discussed, and a resolution come to on the merits of the question, and therefore he should take upon him to overrule the objection to the notice convening the meeting.

Mr. GODSON: Does the chairman mean to say that the board are to set the solicitor's opinion at defiance?

Mr. ROGERS: It will not be the first time. My opinion is that it is a fatal objection, and that any gentleman signing a cheque—supposing that it is not withdrawn—would have to contend with this difficulty, in addition to that of the illegality of signing the cheque.

Mr. GODSON: Then, if the objection is withdrawn, we have nothing to do but to sign the cheque?

Mr. ROGERS: Oh, yes; the board will have to decide whether they will do it or not. Supposing, as I have given an opinion, it is for an illegal payment, or that a question should hereafter arise upon it, the persons signing the cheque will be primarily liable to repay the money; but they could afterwards look to those persons who voted with them to contribute towards it. The proper course, therefore, will be to take a division, so that those gentlemen who do not like to take upon themselves the responsibility of signing the cheque, or voting in its favour, may act accordingly.

Mr. TODD thought that perhaps it would be well, under the circumstances, that he should withdraw his objection to the notice.

Mr. GODSON: Then I shall take leave to withdraw my resolution, as we are told it is illegal, and that if we sign the cheque we shall be doubly done up. Let us have the meeting fair and square, and I will sign the cheque, and take the responsibility of the whole. I never put my shoulder to the wheel without I mean to go through with it.

The CHAIRMAN said, the motion having been moved and seconded, could only be withdrawn by the leave of the meeting.

Mr. GODSON contended that he had a right to withdraw, and certainly should do so after the opinion expressed by Mr. Rogers.

The CHAIRMAN did not see why Mr. Rogers's opinion should have such weight with the honourable member on the present occasion, because, when he (Mr. Godson) had occupied the chair, he had acted in direct opposition to the opinion of the solicitor, who had declared that all payments to the gas inquiry were illegal. Having himself over-ruled that opinion, it was rather too late for the honourable member to urge it as a reason for withdrawing his motion.

Mr. GODSON said he should vote neither one way nor the other.

Mr. DEAKIN, as the seconder, had no objection to the motion being withdrawn, but would like to have the original resolution on the subject of the contribution to the gas inquiry read previously.

After some remarks from Mr. SCUDAMORE,

The CHAIRMAN read the resolution of the board of the 14th of May, 1858. It was as follows:—"That it is expedient for this board to unite with the metropolitan vestries and district boards in seeking to impose restrictions and conditions upon the metropolitan gas companies; and that, with a view to meet the expenses of the parliamentary inquiry, the committee appointed in October last be empowered to state to the meeting of vestries and district boards that this board is willing to contribute its fair proportion to the expenses, to an extent not exceeding £200."

Mr. ROGERS said the question was, whether the other boards had contributed their fair proportion? In reference to the amount specified in the resolution of this board, he believed the £200 was put in by way of a joke. When the question of contributing was before them, Mr. Godson had inserted £20 in the resolution; but, on being appealed to as to the legality of the payment, he (Mr. Rogers) remarked that, as far as amount went, £200 might as well be inserted as £20, and thereupon the honourable member altered his motion to the larger amount.

Mr. AUSTIN inquired whether there was any return of the amounts paid by the various parishes?

Mr. DEAKIN said he was one of the delegates, and he knew, at their last meeting, it was announced that three of the parishes had contributed £200.

The CHAIRMAN said the last returns showed that the following payments had been made:—Chelsea, £20; Clerkenwell, £10; Islington, £10; Kensington, £60; Lambeth, £60; Mile-End Old Town, £10; Paddington, £10; St. George's, £105; St. George-the-Martyr, £10; St. James's, Westminster, £210; St. Martin's, £110; St. Mary, Newington, £35; St. Pancras, £10; Fulham, £10; Greenwich, £10; Holborn, £10; Lewisham, £20; St. Giles's, £110; St. Olave, £20; Strand, £100; and Wandsworth, £60. So that, amongst twenty-one parishes, £1000 had been contributed, and Westminster had paid £110; making £1110. The average of the other parishes had, therefore, been under £50.

Mr. ROGERS: And in the schedule to the Act of Parliament, there are about one hundred parishes in the metropolis.

The question was then put, whether the motion of Mr. Godson should be withdrawn, when it was negatived by a majority of 4.

Mr. TODD wished to be informed for what purpose the money now asked was to be applied! He had been told that it was to prosecute a bill in Parliament.

The CHAIRMAN said it was for any purpose to which the committee might like to put it; the board had no control over the expenditure.

Mr. TODD would like to know whether the proposed bill was a private or a public one?

The CHAIRMAN, referring to the returns made by the delegates, read over the items of expenditure, and repeated that the board had no control over the way in which the money was spent. They were only asked to find money that other people might spend; and it was for them to determine whether that was a proper mode of applying the parish money.

Mr. NORRIS: Is there any bill at all before Parliament?

Mr. TODD said he understood there was a bill. First of all, it was to be a private bill, but in consequence of that there were certain expenses to be incurred; and the delegates having spent £146 with regard to the bill, it was now found that the standing orders of the House had not been complied with.

Mr. SCUDAMORE: That is money thrown away.

Mr. DEAKIN (to the chairman): Do you rule that this is a legal meeting?

The CHAIRMAN: Yes.

Mr. DEAKIN said, some weeks ago the board selected certain of their members to watch the progress of this bill; he happened to be one of those who were appointed, and had, in consequence, attended two or three meetings of the delegates. With respect to the present motion, he conceived that the board having passed a resolution to the effect that they would subscribe a sum not exceeding £200 towards the expenses of carrying through Parliament a bill to regulate the supply of gas, and the price to the consumers; and having actually paid £110 of that sum, it was not exactly the thing for them now to cry over the payment of the balance. He was quite convinced that in the end it would be found they had not paid more in proportion than other parishes. The expenses of prosecuting the bill would be rather great, but not more than one-tenth of what the gas companies would have to pay in order, if possible, to frustrate the measure. What was it the parishes required? They asked to be supplied with pure and wholesome gas at fair and moderate prices, and to be protected from the effects of the monopoly which the companies had established. During the last session, he believed the companies went to £4000 or £5000 expense in opposing the bill; but the delegates, at present, had expended only about £700. The expenses of carrying the bill through Parliament would be about £1500, and the promised contribution of this parish was expected towards that amount. The fees of the House were £400 or £500, and then there were witnesses to be got from country gas-works, which would involve the expenditure of a considerable sum more. He had seen the principal clauses of the bill, which he approved; and, if it became law, he was convinced that the public would have very much more protection than at present, The metropolis teemed with complaints, and it was high time the Legislature interfered with a remedy. He should be sorry to see this board supporting the monopoly of the gas crmpanies.

Mr. AUSTIN considered that their delegates were proceeding in a wrong way. They got their power from this board, and it was only right that they should give a fair answer to a question.

Mr. TODD: Are not the delegates at the present time endeavouring to compromise the matter with the gas companies? If so, they will not require any more money from us, especially if the other parishes pay according to their rateable value.

The CHAIRMAN said he thought the question of whether, if a compromise was made, any more money would be required, was one which no one could answer.

Mr. T. HORN said he recollected very well that when the resolution was come to, to vote £200 conditionally, it was considered that £10 would be

sufficient to cover the expenses, and the £200 was asked for, more by way of a joke than anything else. However, thanks to their solicitor, a saving clause was introduced that the payment should be in proportion to other parishes. Now it had been clearly shown that this board had more than done their duty. Mr. Deakin had spoken of country witnesses coming up, and of the expenses which that would involve; but was this board to be perpetually made the scape-goat for other parishes? He called upon the members present to look after the interests of the poor ratepayers, and not to fly in the face of the opinion of their solicitor, who, on parochial matters, was one of the very best in London, and who had, on various occasions, represented to them the illegal character of these payments. He hoped they would endeavour to day to retrieve their somewhat lost character by refusing to vote any more money.

Mr. FRIEND said he thought it was very unfair for the delegates to come again to this board, before asking the other parishes to contribute their proportion.

Mr. GODSON, in reply, said he did not think the remark that the £200 was voted by way of a joke, was at all complimentary to the board. In reference to other parishes, although St. Pancras stood on the list which had been read as contributing only £10, he knew, as a fact, that a further sum of £100 had been paid by them. As to the bill, he might state that it was a well-understood thing that, before it was introduced into Parliament, the consumers and the companies should have an interview, to endeavour to agree upon clauses. This had been done, and thereby a delay had necessarily been incurred; but, on the 1st of March, it was arranged that the bill should be presented to the House of Commons. Whether the bill was a private or a public one, neither the gentleman who asked the question nor he himself could possibly answer. There were Cochin China and Dorking fowls, and hybrids between the two; and perhaps this bill might partake of the same character, but whether it would turn out a cock or a hen, it was impossible to say. The next point was, whether the board had any option about signing the cheque if there were three members present willing to incur the responsibility. The solicitor had told them that such a cheque would not be paid, and therefore it was useless, at the present meeting, to discuss it; but let it be understood that, whatever the decision of the board might be to-day, it could not affect the question of the signing of the cheque eventually. The delegates had now in hand some £400 or £500; and it was notified, at their last meeting, that several of the parishes had agreed to contribute £30 each for the payment of counsel's fees.

The CHAIRMAN, in putting the resolution, said that, even admitting the payment was legal, it would be only wise for the board to keep the money in their own hands until the other parishes had contributed their proportions, and it was known how much more the delegates would require.

The motion, having been put, was negatived, there being 7 for and 11 against it.

The board then adjourned.

THE OXY-HYDROGEN LIME LIGHT.

SOCIETY OF ARTS, MARCH 22.

Mr. Renton's paper on the oxy-hydrogen lime light, which was published in our issue of January 31st last, was read at the last meeting of the Society of Arts; and, upon its conclusion, a discussion to place, of which the following official report is taken from the Journal of the Society:—

Dr. LETHEBY said that the most important point in the consideration of this subject was the commercial question as to the actual cost of the consumption of the gas which had been exhibited that evening, compared with that of the ordinary coal gas. They had been told that oxygen could be produced at a moderate cost. He thought very few persons acquainted with chemistry, and the mode of producing that gas, would be disposed to agree with the author of the paper in his statement. One mode of producing oxygen was by exposing the peroxyde of manganese to a high temperature, and it was stated that the revivification of the oxyde of manganese could be effected by subjecting it to the action of water, or by exposing it to the atmosphere. He confessed he should very much like to see the peroxide of manganese revivified in such a manner. He would say at once it was impossible. Another mode of producing oxygen was by the decomposition of chlorate of potash. That, he might say, was one of the best means of obtaining it. Now, what was the cost of oxygen produced from chlorate of potash? The chlorate was worth 1s. per lb. If it were brought into use in large quantities, it might perhaps be had at 10d. per lb. 1lb. of the chlorate of potash would produce 4½ cubic feet of oxygen gas. Thus it would take 220·6 lbs. to produce 1000 cubic feet of the gas. 220 lbs. of chlorate of potash at 10d. per lb. would amount to £9 12s., which would be the cost of 1000 cubic feet of oxygen. Now, with regard to the relative cost of this gas as compared with coal gas. The latter was produced at a cost to the manufacturer of 1s. 6d. per 1000 cubic feet, as compared with £9 12s. for the oxygen. That was so far as one of the gases only was concerned, allowing nothing for the hydrogen. If they compared the lime light with that of coal gas, and then considered the relative price of the two, then, at a cost of £9 12s. for oxygen, the light ought to be (foot for foot of gas) 128 times as great as that of coal gas; or, even taking the estimate of the patentee, of £3 15s. per 1000 feet as the cost of the oxygen, the light should then be 50 times as great. Now, 5 feet of common gas per hour were on an average equal to 13 sperm candles, therefore 5 feet of oxygen ought to give the light of 650 candles (at the patentee's estimate), or 1920 at his (Dr. Letheby's) estimate, whilst, in fact, it only gave the light of 895 candles, which was as 2 to 1 as regarded power and cost. He thought that, instead of this light costing only half the price of coal gas, it would cost, irrespective of other considerations, at least twice the price of coal gas. There was another point to be considered, namely, the leakage from the pipes by which the supply was conveyed. That would form a serious item, and would be in the ratio to the present loss from that cause of £9 12s. to 1s. 6d. The leakage of coal gas was a serious matter at the present time to gas manufacturers, but what would it be with gas at £9 12s. per thousand feet? Again, it must not be lost sight of that there was a vast difference between intensity of light and quantity of light. The same quantity of light given by jets of coal gas around the room would make a very agreeable light. In the present case, they had an intense light, which few would like to have constantly before them. It would be likely, in his opinion, to bring on paralysis of the retina. The intensity of light was not what was wanted. The great art in modern lighting was the diffusion of light—quantity and not intensity. This light might answer where penetrating power was required, as in light-houses and signal-stations, but for the ordinary illumination of a room it would be excessively dangerous to the sight. He could speak upon this point from personal experience. He found that, after experiments with the oxy-hydrogen light, as well as the electric light, he experienced a sort of paralysis of the retina, and he was sometimes obliged to give up work for a time. If this were to be the common light adopted, it would be most injurious. With regard to coal gas, they could reduce the light to that of a single jet, but with this light it was impossible; there were no means of letting it down to the power of two or three candles for a small room. They must have a light which almost blinded them, or no light at all. Looking at the matter from all points of view, he was struck, in the first place, with the erroneous statements in the paper as to the cost of the light, and, in the second place, as to the way in which it could be commonly used. As far as his own experience went, he believed the light would be a most expensive one—more expensive, probably, than even the electric light; in fact, the most expensive light that could be adopted; and, in the next place, he looked upon it as one of the most dangerous to the eyesight of those using it.

Dr. BACHHOFFNER said, having had more experience with his light probably than any other man, having been engaged in the use of it daily for upwards of twenty years, he might be supposed to understand something about it. As far as the introduction of the lime light for the ordinary purposes of illumination was concerned, he believed it would fail. It was quite impossible that it could supersede any light at present in use for domestic purposes. But he could not entirely agree with the views of the last speaker. He thought he had greatly overrated the cost of the lime light. He did not consider the light exhibited that evening, even when burning at its maximum, to be satisfactory. He should be sorry to use such a light for the oxy-hydrogen microscope. The pressure employed was inadequate to produce the results which he required for his purposes. He never considered the light was a good one, unless it was accompanied by a good deal of the whistling noise which they heard at times that evening, and which was caused by the great pressure which he thought indispensable. That was with him the test of a good light. With a pressure of a head of water 13 inches, he obtained a light equal to 25.9 argand burners, each consuming 6 feet of gas per hour; and he calculated the cost of the lime light produced by oxygen and coal gas, at 1s. 10½d. per hour, whilst the cost of coal gas to produce the same amount of light would be 8½d. per hour. If pure hydrogen gas were used instead of the coal gas, in union with the oxygen, the cost, he believed, would be about 3s. 3¼d. per hour. Speaking generally of the lime light, he considered it was too concentrated to be available for lighting streets, and the shadow it threw was too intense. Although he confessed his retina had not been affected in the way described by Dr. Letheby, he nevertheless thought it quite likely that persons unaccustomed to this light might experience the inconvenience to which Dr. Letheby had referred. As he had already stated, he did not agree with Dr. Letheby in his calculation of the cost of the oxygen gas, viz., £9 12s. per thousand feet. The chlorate of potash had been referred to as one material from which this gas could be produced. He had practised that system for a long time, and found that it was not only a very expensive mode, but was most detrimental to the brass fittings of his apparatus. He found the chlorate of potash very expensive. The cheapest mode of producing oxygen gas from the peroxide of manganese, but with regard to its revivification, he should be glad if anyone would tell him how to restore it, for he had some tons of it which were useless to him. Then again, it was said that the hydrogen gas cost nothing, because the residuum consisted of sulphate of zinc, which was said to be a marketable commodity. All he had to say upon that was, that he had seen hundreds of tons of that material thrown away, as people would not be at the trouble of fetching it, and he believed it was impossible to give a marketable value to the exhausted peroxide of manganese. He should be glad to see any description of light which should supersede the present system; but, until that was done, they must be content with gas, with all its inconveniences.

Mr. C. H. SMITH wished, before the discussion proceeded further, to say one word upon the subject of cost, not merely with regard to this light, but generally. When there was a great demand for any article, it usually became reduced in value. To take the instance of needles. If they were to ask a person to make a needle who had never made one before, he would probably consider himself ill-paid if he received a guinea for it, yet they knew how cheap needles were. So it was with reference to the cost of producing oxygen and hydrogen gases. There was no substance in the world so abundant as oxygen—it formed one of the constituents of water. He thought it was not impossible that they would find out how to manufacture it in various ways, at a much cheaper rate than from the black oxide of manganese. He thought, therefore, no invention should be thought lightly of merely because it was expensive at first.

Mr. VARLEY remarked that many varieties of artificial light had been tried by this Society, but he considered the plan by which the room was now lighted, that of rings of gas jets, was the best that had ever been introduced. There could be no question as to the extreme purity of the lime light, but what they wanted was quantity of light without intensity.

Mr. G. F. WILSON, F.R.S., said he thought both Mr. Stone and the author of the paper were reasoning on a fallacy when they assumed that "oxygen gas had not hitherto been in demand for many objects." He thought all chemists present would agree with him that there were an infinity of chemical manufactures in which cheap oxygen was at present a great desideratum.

Mr. DENNIS thought that this light was more adapted to light-houses and the purposes of signalling. It certainly would never do for lighting the streets. He had seen the lime light exhibited in King William Street, and he was quite impressed with its unsuitableness for that purpose.

Mr. CALVERT said he saw nothing new in the plan now brought forward, beyond the prineiple of the old oxy-hydrogen blowpipe. The lime light had been known for many years. He regarded this as an old thing brought forward in a new shape. He hoped, therefore, before long to see a light which should supersede gas and all other artificial lights yet introduced; but he felt confident that this would not be done by this light in its present form. With regard to the manufacture of oxygen gas from the peroxyde of manganese, he might say that millions of tons of that material were to be procured in Cornwall; but, when they had got it, the manufacture of oxygen gas was most expensive. He would suggest that the company by whom the lime light was promoted should try to give them a good practicable light from one gas only, and he would recommend them to look to the purer gas hydrogen, and to the obtaining this by the decomposition of water by more simple means than had been yet arrived at. He thought that they could thus not only obtain light, but heat to any extent. He did not think it unlikely that before long they would see people using, in their fireplaces, a can of water instead of a scuttle of coals.

Mr. WILLIAM HAWES thought justice had been done to the gentleman who had brought this subject before them. First of all, they had one scientific gentleman who told them that, because at the present time, the materials used for the production of the light were expensive, therefore the light itself must be condemned, and never could be made useful. If this same argument had been applied years ago to coal gas, the prophecy would have been about as true as that now put forward was likely to prove, for it was in the recollection of many, that coal gas was formerly as costly, as compared with candles, as this light was now stated to be, as compared with coal

gas at the present time. He would not go into the argument as to the side on which the truth lay, as between the two scientific gentlemen who had spoken and the inventor of this light, because the two scientific gentlemen differed so much from each other, both as to the cost, and as to its injurious effects on the eye. They were as far from each other in the calculation of the cost, as either of them was from the author of the paper. Then it was said by another gentleman that this was not a new thing. Were not almost all the great discoveries old things reproduced, when accumulated labour, science, and experience had been superadded to render them practically available. Was not that the case with the steam-engine and the Jacquard loom? Were not those the results of the adaptation of old things brought to perfection by the additions which experience had shown to be required? Was this invention to be discarded because other people had been unsuccessful in the use of the materials employed? Was it to be discarded because oxygen gas was dear now, when it was known that the materials for its manufacture were to be obtained at a low price? Let them rather encourage those who brought this light before them, and urge them to press on to the discovery of further improvements, so that in the course of time the light might be as cheap as it was brilliant. They were told that this lime light only consumed 36 feet in two hours, whilst the gas with which that room was ordinarily lighted was consumed at the rate of 3000 feet in the same time. He could not but admit that the light in its present state was not applicable to many of the ordinary purposes, but the tendency of illumination in the present day was to concentrate light in one spot, as was manifested by the increasing use of the "sun-light," which was placed at sufficient height to distribute the light over a large space below; and, if the light exhibited that evening had been placed at the top of the room and diffused by proper media, he could not conceive a more perfect light.

Mr. PEARSALL remarked that he had seen this light before, and he was struck with the discrepancies of opinion which existed upon the subject of its cost. He was, therefore, glad that the matter had been fairly brought under discussion. He quite agreed with the opinions expressed as to the impracticability of revivifying the oxide of manganese, but he differed from those who thought oxygen gas could not be obtained cheaply if there was a commercial demand for it. Water contained both oxygen and hydrogen, and all they had to do was to decompose that. As to the sources from whence oxygen gas could be derived, it existed in large quantities in nitrate of soda. and by the action of heat in a retort, oxygen would be produced, the residuum (nitrate of soda) being a marketable commodity, which the soap and alkali makers would use in large quantities. Here they had a concentrated light, of great power and brilliancy, and he would ask whether this light could be exposed to the winds and the waters without any covering? because, if that were the case, for light-houses and ships at sea, it would be invaluable. He had been informed that the Company had stated that the light was exposed on board the *Great Eastern* during a tremendous storm of wind and heavy rain, and seemed to be unaffected, although completely unprotected.

Mr. LAMBERT said that, about four years ago, some facts came to his knowledge with reference to the manufacture of oxygen gas which he believed had not been made public. He was formerly acquainted with a German chemist, Mr. G. Michiels, who erected works costing some thousands of pounds, for obtaining oxygen from atmospheric air. He constructed an apparatus for passing the atmospheric air, at a moderately high temperature, over hydrate of baryta, which absorbed the oxygen and allowed the nitrogen to pass off. He had a means of ascertaining when the baryta had absorbed all the oxygen it could, and at this stage the temperature was raised still further, and oxygen gas was evolved, and carried into a gasholder. He was able to fill a gas-holder one-sixth the size of that room, entirely filled with oxygen gas. It, however, unfortunately happened, that the gentleman to whom he alluded met with his death through an accident in his laboratory, in consequence of which the apparatus was taken down and the experiments ended, but that gentleman assured him that oxygen gas so obtained could be supplied commercially at about the same price as common gas.

Mr. W. E. NEWTON could not refrain from expressing his astonishment at hearing, amongst a body of scientific men, that anything was impossible in science. There were many things which people thought impossible now which they would find very possible in a short time. They had heard the different processes referred to by which oxygen gas could be produced at a considerably less price that £9. 10s. per 1000 cubic feet. He thought Dr. Letheby must have argued from his laboratory operations on a small scale, rather than from looking at the matter in a commercial point of view. With regard to the production of oxygen and hydrogen gases from water, it might not be generally known that there had been several schemes patented for obtaining carburetted hydrogen gas from the decomposition of water. The most complete plan for effecting this was one patented by a Mr. White, but he believed it had not been entirely successful. It was found that, when hydrogen gas was made from water, and impregnated with carbon by passing it over some hydrocarbon, as it traversed the pipes used for its transmission, the carbon was deposited, and the gas again became pure hydrogen, which would only give a pale blue-light. He had listened to the paper with attention, but he had failed to discover anything new in this plan of lighting. The oxy-hydrogen light had been known since the days of Sir Humphry Davy. It had been in daily use at the Colosseum for years past. He gathered that the only novelty which was claimed in the present case was a contrivance for preventing the decrepitation of the cylinder of lime. He knew that that was a serious matter, for it sometimes happened in the middle of an experiment that a lump of the lime gave way, and the light went out. If the inventor had hit upon a plan whereby he prevented the lime from cracking away, that was an important step in advance. With that exception, he was unable to see what merit was claimed.

Dr. SQUIRE said the cheapest method of producing oxygen gas with which he was acquainted was that described by Mr. Lambert, which consisted in passing air over hydrate of baryta, which then became an oxyde of barium, from which the oxygen could easily be obtained. For the manufacture of hydrogen gas the best method was to pass steam over ignited iron, by which they avoided the formation of sulphate of zinc, (as in the ordinary process,) which was said to be an unsaleable commodity; and they also got rid of the great expense of the zinc and sulphuric acid. Even if they could reduce the cost of this light to the present cost of coal gas, the question arose whether it would be applicable for lighting the streets. He did not think it would, inasmuch as light decreased as the square of the distance from its source. It was, therefore, evident that in long lines of streets, it was better not to concentrate the lights at one or two points. The only purposes to which he imagined this light was applicable were for lighthouses and rooms in large buildings. Then it became a question whether it would pay to erect a special manufactory of oxygen and hydrogen gases at each lighthouse and public building, for, unless the light was brought into general use for the streets, it would not pay the cost of transmitting the gases through an extended system or pipes.

Mr. NEWTON added that the plan of Mr. White for obtaining hydrogen gas by the decomposition of water, was to pass the vapour of water over heated iron, which took up the oxygen, and the hydrogen came away.

Mr. HAWES remarked, in reply to the observations of Dr. Squire, that one merit of this light appeared to him to consist in the small consumption of the gases and their portability. A sufficient supply for a service at a church could be conveyed in bags, the size of those used for the exhibition of the light that evening.

Mr. MCLACHLAN inquired whether, in the present plan, any additional means of safety were provided as compared with the ordinary oxy-hydrogen light? The communication between the two bags containing the gases was not entirely cut off, and there was a strong tendency for the gases to mingle one with the other. He had known a case in which, owing to a want of proper care with the bags, a serious explosion occurred.

Dr. BACHHOFFNER replied that, wherever oxygen and hydrogen gases were employed, an explosion was possible, though, with proper care, there was no need for fear. The gases might be employed with absolute safety, provided there was sufficient length of pipe between the reservoirs and the point of combustion.

Mr. STRODE said, it would have been satisfactory, to him to have heard some further explanation of the modes by which it was proposed to produce the oxygen gas, as well as with regard to the special arrangements of the lighting apparatus adopted in the present instance. It was important to ascertain the purposes to which this light was applicable, and those to which it was not applicable. He conceived that, if the light could be produced at a reasonable cost, it was well adapted for light-houses and railway-signals, inasmuch as it afforded a concentrated and powerful light to be dealt with by reflectors. Although such a light would be invaluable for such purposes, still it would be useless for private rooms, even very large rooms, if reflectors were to be used. At the same time, it did not follow that it could not be used in large rooms, such as that of the Society of Arts, the light being regulated through proper media. Then there remained the grand question—could it be done at a cost which would render it a practically useful light? That was a point which he was not able to answer; but, from what he had heard of the manufacture of oxygen gas, he apprehended there had been an exaggeration as to the amount of that gas which could be obtained from the peroxide of manganese. In his opinion, Dr. Bachhoffner's calculations as to the cost of that gas were nearest the fact. In street lighting, he thought this plan would be useless. The trials with the Bude and electric lights were sufficient to show that large central lights did not meet the requirements of the case. They produced an immense glare of light at one point, which made the gloom beyond look the deeper. In street lighting, the size of the light must be diminished, and the number of lights increased.

The CHAIRMAN, in closing the discussion, said notwithstanding the differences of opinion which had been expressed as to the merits of the plan which had been brought before them that evening, he was sure the meeting would do that to which the author of the paper was fairly entitled—viz., accord him their thanks for having brought before them a subject of considerable interest, and which had afforded them, as he believed, a not unprofitable discussion. He agreed with Mr. Hawes, that they had an illustration that evening of a topic which was presented to them a few weeks ago, as to the difference of opinion which existed amongst scientific men. To an unlearned mind, it would seem that there could be few discrepancies greater than those which existed between Dr. Letheby and Dr. Bachhoffner as to the cost of producing oxygen gas. Having regard to what was obviously imperfect knowledge, they would come to a conclusion which was not warranted by the information they now possessed, if they said that this invention could not be applied to any useful practical purpose. Possibly, it might not become universally applicable, but it was conceded that, for certain limited objects, it might be an extremely valuable application of light. In those cases where intensity of light was aimed at, it accomplished that object in a very successful manner; and, with regard to the purity of the light, they had seen that it was complete and perfect, and the difficulty which formerly existed in respect of the continuity of the light had now been got over. That appeared to be the principal merit claimed by the author of the paper for the invention described. He would now only ask them to convey their thanks to the author of the paper. He was sorry Mr. Baxter was not able to be present to give them any further information they might require; but he was sure, in his absence, they would accord him their thanks.

The vote of thanks was then passed.

CHESTER UNITED GAS COMPANY.

The Annual General Meeting of the Company was held at the Company's Offices, at the Rhoodee, on Monday the 16th instant—Mr. THOMAS ROBERTS in the chair.

The notice convening the meeting having been read by the SECRETARY, and the seal of the company attached to the register of proprietors, the following report from the directors was presented and adopted:—

Report from the Directors to the Proprietors and Shareholders.

The directors, in laying before the shareholders the following statement of general accounts for the year ending Dec. 31, 1859, have much satisfaction in congratulating the shareholders on the favourable result which it exhibits.

Gas sold per meters and public lamps		£9,775	13 11
Coke, tar, and other residium		814	18 11
Rent of meters, less cost of inspection and repairs		198	2 3
Balance of cartage account		15	8 3
		£10,804	3 4
Cost of coal and cannel used	£3,128 17 8		
Direction, management, wages of stokers, and other labourers	1,560 12 10		
Office salaries, and other expenses, and auditor's fee	643 8 3		
Interest on loans and bank commission	533 16 8		
Wear and tear of retorts, repairs of mains, &c.	440 13 7		
Rates, taxes, and insurance	248 3 5		
Rent of yard and Cuppin Street premises	167 4 7		
Lime for purification	116 11 1		
Bad debts	36 17 6		
Repairs and alterations of offices	26 13 0		
Law charges	22 14 2		
Renewal of engine and exhausters	103 1 3		
		7,028	14 0
Balance, being profits on year's working		£3,775	9 4

The sum of £1725. 10s. has been paid for dividend on the preference stock for the year 1859. The sum of £23. 12. 6d. will be required to pay the agreed dividend of £7 per cent. on the amount paid upon new shares, and the directors recommend that a dividend, at the rate of £6 per cent. per annum, shall be paid upon the ordinary stock for the year ending the 31st of December last, leaving a balance of £158. 16s. 10d. to be carried to the reserve-fund.

The directors, after consulting very competent practical authorities, determined, in the summer of last year, to put up new exhausters and a new engine, and they made their arrangements with a view to having the new apparatus in full working

order by the beginning of September, when the increased consumption of gas usually commences. Unfortunately, from circumstances quite beyond the control of the directors, the apparatus was not completed so soon as was anticipated, but it has been at work for some weeks past, and has already proved of considerable advantage. So far as it has been tried, it has answered the expectations of the directors, and it will enable the company to meet any increased demand for gas which can be reasonably anticipated.

During the last year, an Act of Parliament was passed, intituled "An Act for regulating the measures used in sales of gas," which establishes a legal standard for the measure of gas, and requires that all meters, to be fixed after the expiration of twelve months from the passing of the Act—*i.e.*, "after the 13th of August, 1860"—shall be examined and tested by this standard, and those found correct are to be stamped. The Act also directs that, after ten years from the passing of the Act—*i. e.*, "after the 13th of August, 1869"—all meters not previously stamped, shall be examined and tested by the standard meter. This Act will, undoubtedly, entail considerable expense for a few years upon the company, but if it succeed, as your directors hope it may, in securing accuracy in the register of gas consumed, they are of opinion that it will be satisfactory to the manufacturers of gas as well as to consumers, for whose protection it would appear to have been intended.

The directors have been very desirous to make some arrangement for turning to account such portion of Cuppin-Street premises as is not now required for the purposes of the company, and they have made several attempts to do so, but hitherto without success. Negotiations are, however, now in progress, which it is hoped will shortly be concluded favourably.

The directors retiring from office are Messrs. F. L. Bagnall, T. G. Frost, and Joseph Harger, who are eligible, and offer themselves for re-election.

Mr. John Jones, the auditor of the company's accounts, retires from office. The directors recommend that he should be re-elected.

(Signed) THOMAS ROBERTS, Chairman.
JAMES PYE, Secretary.

Chester, Jan. 16, 1860.

Resolutions authorizing the payment of £7 per cent. on the preference stock, and £6 per cent. on the ordinary stock of the company were carried; and the retiring directors, Messrs. F. L. Bagnall, T. G. Frost, and Joseph Harger, were re-elected.

Mr. Jones, of Westminster Buildings, was elected auditor of the company's accounts for the ensuing year; and, after a vote of thanks to the chairman, the meeting separated.

DR. LETHEBY'S REPORT ON THE GREAT CENTRAL GAS,

WITH A SUMMARY OF THE EXPERIMENTS ON THE ILLUMINATING POWER AND CHEMICAL QUALITY OF THE GAS SUPPLIED TO THE CITY OF LONDON DURING THE LAST EIGHT YEARS.

To the Honourable Commissioners of Sewers of the City of London.

Gentlemen,—I have the honour to submit my quarterly report of the illuminating power and chemical quality of the gas supplied to the City of London by the Great Central Gas Consumers' Company.

In the course of the last three months, 246 experiments have been made on the gas, and the average illuminating power, when tested in accordance with the Act of Parliament instructions from an argand burner of fifteen holes with a seven-inch chimney, and burning at the rate of five cubic feet per hour, has been equal to that of 13·55 sperm candles, or 15·49 wax—each burning at the rate of 120 grains per hour. This is just twenty-nine per cent. above the requirements of the Act of Parliament.

The chemical quality of the gas has been equally satisfactory as regards the absence of the grosser impurities—ammonia, sulphuretted hydrogen, and fœtid tar matter.

At the present time, when the subject of the quality of the gas supplied to the metropolis is under the consideration of Parliament, it may not be out of place to refer to the general results of the testings of the Great Central gas during the last eight years. In the course of that time, I have submitted to you thirty-two quarterly reports, and they express the results of about 3500 experiments, the main features of which are as follows:—

1. That the average power of the gas has been equal to that of 13·00 sperm candles, or 14·83 wax. This is nearly twenty-five per cent. above the standard of the Great Central Act (14 and 15 Vic., cap. 59.) The averages of the returns stand thus:—

Quarter ending	Number of Experiments.	Illuminating Power.	
		Sperm 120.	Wax 120.
May	673	12·89	14·74
August	874	12·75	14·58
November	887	13·02	14·88
February	1084	13·21	15·10
Eight Years	3518	13·00	14·83

In this case, the gas was burnt from an argand burner of fifteen holes with a seven-inch chimney, and at the rate of five cubic feet per hour; but when it was burnt from bat'swing and fishtail jets of different sizes it had the following illuminating power:—

Consumption per Hour, Cubic Feet.	Illuminating Power.			
	Sperm of 120.		Wax of 120.	
	Fishtail.	Bat'swing.	Fishtail.	Bat'swing.
3·50	8·14	8·00	9·30	9·14
3·75	8·92	8·74	10·19	9·99
4·00	9·50	9·36	10·86	10·70
4·50	10·13	10·11	11·58	11·55
5·00	11·80	11·75	13·49	13·43
Average power per foot	2·34	2·31	2·67	2·64
	Argand, 2·61.		Argand, 2·99.	

In these several methods of burning the gas, there is an advantage of about eleven per cent. in favour of the argand.

2. The average rate at which a sperm candle burns per hour is 132 grains, and a wax is 172. The number 120, which is fixed as the standard for comparison in all the Acts of Parliament relating to this subject is, therefore, too low, for it is rarely if ever obtained in practice.

3. It has been ascertained as the result of above 1000 experiments, that the relation of the illuminating power of wax and sperm candles when both are burning at the same rate, or are reduced to the same standard—namely, 120 grains per hour, is sixteen wax to fourteen sperm; and as it is very difficult to secure the uniform or proper consumption of wax in testing the illuminating power of gas, it is most convenient to use sperm in the experiment, and then to calculate its value into wax according to the ascertained values.

4. In respect of the chemical quality of the gas it has been determined that, as a rule, the gas is entirely free from sulphuretted hydrogen; that it does not contain more than twenty grains of sulphur in any form in 100 cubic feet of gas; and that the proportion of ammonia does not exceed five grains per 1000 feet. The absence of ammonia is a matter of some importance, because the alkali acts corrosively on copper and brass fittings, and is the cause of the presence of offensive smelling tar in gas.

These results are sufficiently extensive to be made the basis of future inquiries into the subject.

I have the honour, Gentlemen, to remain your obedient servant,
HY. LETHEBY.

Guildhall, February 14th, 1860.

Table of the Quarterly and Annual Average Illuminating Power of the Great Central Gas, during a period of Eight Years.

Years ending	Sperm Candles of 120 grains consumption per Hour.				Wax Candles of 120 grains consumption per hour.				Yearly Results.		
	Quarter ending in May.	Quarter ending in August.	Quarter ending in November.	Quarter ending in February.	Quarter ending in May.	Quarter ending in August.	Quarter ending in November.	Quarter ending in February.	Sperm 120.	Wax 120.	Number of Experiments.
1853	14·88	13·86	13·34	13·90	17·00	15·84	15·24	15·89	13·99	15·99	802
1854	12·50	13·90	13·34	12·80	14·30	15·90	15·24	14·63	13·13	15·02	245
1855	12·80	13·80	13·32	13·20	14·63	15·77	15·22	15·09	13·28	15·18	149
1856	13·14	13·31	12·94	13·76	15·02	15·24	14·80	15·73	13·29	15·19	171
1857	13·25	13·75	12·50	12·89	15·14	14·57	14·30	14·73	12·85	14·69	242
1858	12·30	10·75	12·58	12·64	14·05	12·30	14·37	14·44	12·07	13·79	364
1859	12·34	12·11	13·25	12·98	14·16	13·84	15·14	14·83	12·67	14·49	604
1860	11·95	11·51	12·92	13·55	13·66	13·15	14·77	15·49	12·96	14·27	941
Averages	12·89	12·75	13·02	13·21	14·74	14·58	14·88	15·10	13·00	14·83	440

NOTE.—The gas was burnt in accordance with the instructions of the Act of Parliament, namely, from an argand burner of 15 holes, with a 7-inch chimney, and at the rate of 5 cubic feet per hour. The comparison was always with a sperm candle of 6 to the pound, burning at the rate of 120 grains per hour; and the value of wax candles, of the same consumption, was estimated in the proportion of 14 sperm candles to 16 wax. In practice, it is found that the average consumption of the sperm candle is 132 grains per hour, and of the wax 172.

GAS AT GEELONG.—The *Melbourne Argus* says, "the operations of the Geelong Gas Company are progressing very favourably, and as the work of laying the pipes is now brought into the heart of the town, and is apparent to every one, a notice of the undertaking will not be out of place. The original capital of the company was to have been £50,000, in £5 shares; but it is expected that £30,000 will be sufficient to complete the whole of the operations of the company. There are just now about 300 shareholders, representing £30,000; and £3 a share has been paid up, the value of the shares being at par. The land on which the company's works are to be erected is at West Geelong, about half a mile from the beach, and adjoining the Geelong and Melbourne Railway. It is about 2¼ acres in extent, cost £275 an acre, and is now wholly enclosed with a substantial and neat spiked paling fence. Immediately adjoining the railway siding is the coal-store and retort-house. The gas being made here, it is then passed to the condenser; from this it is carried to the scrubber, then to the purifiers, thence through the station meter, and lastly into the gas-holder. The plan of the buildings seems to be well contrived. The large excavation for the gas-holder has just been completed, and the bricklayers have commenced laying the first tier of bricks. The excavation is about 256 feet in circumference, and 20 feet deep, which will leave the actual size after bricking, 72 feet diameter and 20 feet in depth. A well is also being sunk on the property, the men having got down 82 feet, and obtained a fair supply of indifferent water. The tar tanks are also in process of excavation, and on the ground are stacked about 130,000 bricks. The quantity of plant received to this time is about eight miles of piping of various sizes, condensing apparatus, wrought-iron roof for retort-house, portion of retort fittings, station meter and governor for regulating supply of gas to consumers. Besides this, the following plant has been shipped for the colony, retorts and 50·000 feet of service-piping, gas-holder, and fire-bricks, the purifiers, and about 300 meters. A 10-inch main has been laid down from the works as far as the dam, about one and a half miles, and smaller mains have been laid through portions of some of the streets. Each main street is to be supplied with two mains, placed under the footpaths, just within the kerbing. This plan has been resolved on to save expense and labour, also time and inconvenience in laying on the services. All the pipes of six inches diameter and under are made and fitted to each other on a new principle; that is, they have turned and bored joints, fitting together tightly with red lead, and saving the expense and trouble of soldering. The tenders for the company's buildings are called for, and will most likely be settled next week. The company expect to be in a position to commence operations in April next, and to be able to supply, if required, 80,000 cubic feet of gas per diem, Arrangements have been made for the importation of 200 tons of Boghead cannel coal, which, with a proportion of colonial, will be used at starting.

Price Current.

CASTINGS, per Ton.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 0 0	3 2 6	3 0 0	3 5 0	3 10 0
1¼ and 2 inches Socket-Pipes	7 0 0	6 0 0	6 5 0	6 10 0	6 15 0
2½ and 3 ,, ,,	6 10 0	5 10 0	5 15 0	6 0 0	6 5 0
4 and 5 ,, ,,	6 0 0	5 0 0	5 5 0	5 10 0	5 15 0
6 in. and upwards ,,	5 15 0	4 15 0	5 0 0	5 5 0	5 10 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 15 0	5 0 0	5 5 0
,, 2nd ,, cold ,,	6 10 0	5 5 0	5 10 0	6 0 0	6 5 0
Tank Plates, ⅛ thick and above	6 0 0	5 0 0	5 5 0	5 10 0	5 10 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
,, ,, ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
,, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets [Nipples	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	—

COALS, per Ton.

Newcastle.—Unscreened.	6s. 3d.	*Scotch Cannel.*	45s. 0d.
Whitwell Primrose		Boghead, at Leith	
Medomsley, Eighton Moor, and Burnhope	6 6	Kirkness, best	23 0
Pelaw	6 9	Capeidrae, 1st quality	20 0
New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	7 0	,, 2nd ,,	12 6
Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	,, ,, Leith	27 6
		Arniston	22 0
		Wemyss	20 0
		Knightswood	20 0
		Pirnie	18 0
			15 0

FREIGHTS.

Coastwise—Newcastle.—Per Ton.	7s. 0d.	*Foreign.—Per Keel.*	£8 0 0
Chatham & Rochester		Boulogne and Calais	
Cork	10 6	Barcelona	23 0 0
Dover	8 0	Bordeaux	15 0 0
Dublin	12 0	Cadiz	15 0 0
Exeter Quay	10 0	Copenhagen	—
Folkestone	8 0	Dieppe	10 15 0
London (Pool)	6 3	Genoa	23 0 0
Lowestoft & Yarmouth	5 0	Hamburg	9 0 0
Lynn	—	Havre	10 0 0
Portsmouth	7 3	Leghorn	23 0 0
Plymouth	9 6	Lisbon	15 0 0
Ramsgate	8 0	Rotterdam	—
Whitstable	7 0	Stettin	9 10 0
Weymouth	—	Trieste & Venice	£25 to 26 0 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000	50s. 0d.	
Cliff's Fire-bricks, at Wortley	per 1000	57 6	
Ingham's Fire-bricks, at Wortley	,,	55 0	
Fire-clay Retorts	per foot run, 5s. 6d. to	7 0	
Tough Cake Copper	per ton	£117 0s.	
English Pig Lead	,,	22 15	
Welch Bar Iron, in London	,,	6 15 0	
Tarred Rope Yarn	per cwt.	26s. 0d.	
Foreign Spelter	per ton	£ 20 15 0	
English Block Tin	,,	136 0 0	
Banca	,,	136 0 0	

Advertisements.

THE STANDARD CUBIC FOOT.

E. W. LADD and CO. are now prepared to supply Copies of the Standard Cubic Foot constructed by them for the Office of Her Majesty's Exchequer.

E. W. LADD AND CO.,

Standard Weight and Measure Manufacturers, and Hydrometer, &c., Makers to the Board of Inland Revenue,

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TRUSS'S PATENT ELASTIC PIPE-JOINT,

FOR GAS, WATER, AND STEAM,

Is the only PERFECT joint that has ever been constructed, and supplies the long-felt desideratum, by allowing for the expansion and contraction of metals, and for oscillation and deflection, without impairing the joint. Gas Companies will effect an incalculable saving in adopting it, as compared with the present imperfect mode of jointing.

Drawings, Estimates, and every particular, furnished on application to

THOMAS SEAVILLE TRUSS, C.E., 53, GRACECHURCH STREET, LONDON, E.C.

ESSON'S PATENT

COMPENSATING GAS-METER

Is guaranteed correct within the meaning of the "Sale of Gas Act." Manufactured only by WILLIAM COWAN, Buccleuch Street Works, EDINBURGH; and Strutt Street, MANCHESTER.—Established 1827.

FLOATS AND MECHANICAL VALVES ENTIRELY DISPENSED WITH.

KAY'S PATENT HYDRAULIC VALVE GAS-METER

Meets all the requirements of the Sale of Gas Act.

The only cheap means of bringing ordinary Meters within the limits of the Act is to affix to them the Hydraulic Valve, which can be done at a small cost, for which purpose Gas Companies can obtain a license from the Sole Manufacturer and Licensee,

WILLIAM COWAN,

Buccleuch Street Works, EDINBURGH; and Strutt Street, MANCHESTER.

Now Ready, Price 2s., the Second Edition of

MARRIOTT'S Gas Consumer's MANUAL; containing the Gas Measurement Act of 1859, with a Practical View of its Provisions: for the use of Gas Consumers, Inspectors, and Gas Companies.

KELLY and Co., OLD BOSWELL COURT, W.C.; WEALE, 59, HIGH HOLBORN, W.C.; SIMPKIN, MARSHALL, and Co.; and all Booksellers.

Just Published, Price 1s.; by Post, 1s. 1d.,

A LETTER to the Secretary of STATE for the HOME DEPARTMENT on the SUPPLY of GAS in the METROPOLIS.

By THOMAS G. BARLOW, C.E.

W. B. KING, 11, Bolt Court, Fleet Street, LONDON.

NOW READY,

VOL. VIII. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1859, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., V., VI., and VII. are still on sale.

W. B. KING, 11, Bolt Court, Fleet Street.

TO GAS COMPANIES.

STOKER'S GLOVES, 11s. per Dozen.

S. CARPENTER, 3, BOW COMMON.

METROPOLITAN BOARD OF WORKS.

MAIN DRAINAGE OF THE METROPOLIS.

SOUTHERN OUTFALL TUNNEL SEWER.

TO Builders and Contractors ex- perienced in Tunnel Works. The Metropolitan Board of Works hereby give notice, that they will MEET in the Council Chamber, Guildhall, in the City of London, on FRIDAY, the 2nd day of March next, at TWELVE o'clock at Noon precisely, and will then be prepared to open TENDERS by parties who may be willing to CONTRACT for the CONSTRUCTION of a MAIN BRICK SEWER, 7 miles 2240 feet in length, or thereabouts (5000 feet of this length being in tunnel), and for the execution of other works in connexion therewith; such Sewer to extend from a point in Erith Marshes, opposite Dagenham Breach, in the county of Kent, to Woolwich, and through and under Woolwich to Norman's Road, otherwise North Pole Lane, Greenwich, in the same county.

Parties desirous of submitting Tenders may, upon payment of £3, obtain Plans, Sections, Specification, Form of Tender, and other particulars, on application to Mr. J. W. BAZALGETTE, Engineer of the Board, at the Office of the Board, between the hours of Nine a.m. and Four p.m.

Tenders, addressed to the Metropolitan Board of Works, must be delivered at the Office of the Board, No 1, Greek Street, SOHO, before Four o'clock p.m., on Thursday, the 1st day of March, 1860, and no Tender will be received after that hour.

The Board do not bind themselves to accept the lowest, or any Tender, and the party whose Tender shall be accepted will be required to provide two approved sureties for the due performance of the works.

JOHN POLLARD, Clerk of the Board.

No. 1, Greek Street, Soho, Feb. 4, 1860.

METROPOLITAN BOARD OF WORKS.

PERCHLORIDE OF IRON.

TO Chemists, Manufacturers of DEODORIZING AGENTS, and other Persons. The Metropolitan Board of Works hereby give notice, that they will MEET in the Council Chamber, Guildhall, in the city of London, on FRIDAY, the 16th day of March now next, at twelve o'clock at noon precisely, and will then be willing to open TENDERS for the SUPPLY of PERCHLORIDE of IRON for deodorizing purposes, during the summer months of the present year, on the following, amongst other conditions:—

That, within six weeks after receiving a notice to that effect, the Contractor shall deliver at such localities as shall be indicated, within the Metropolitan area, 5000 gallons or thereabouts per diem of Perchloride of Iron; and, within a further period of three weeks after receiving a similar notice, he shall deliver such increased quantity as may be required, not being more than double the qauntity above named;

That he will regularly continue such supply during the Summer months until he shall receive fourteen days' notice to diminish or discontinue it;

That the Tender shall state the price per gallon, delivered at the several stations specified, and shall include the cost of bottles, casks, and packages, which shall be the property of the Contractor, and shall be collected by him, when empty, at his own expense. That the Perchloride supplied shall contain not less than 1 lb. avoirdupois of Iron per gallon in the form of Perchloride, corresponding to 2lbs. 14½oz. of Perchloride, and not more than 1 oz. avoirdupois per gallon of free Hydrochloric Acid.

That each quantity delivered shall be tested as to its compliance with the foregoing conditions, and any fluid which does not come up to that standard shall be rejected and removed at the cost of the Contractor.

The Specification may be inspected, and form of Tender and further particulars obtained, at the offices of the Board, No. 1, Greek Street, Soho, on and after Wednesday, the 29th day of February instant, between the hours of Nine a.m. and Four p.m., until Thursday the 15th day of March now next.

Tenders, addressed to the Metropolitan Board of Works, must be delivered at their offices before Four o'clock on the last-mentioned day, and no Tender will be received after that hour.

The Board do not bind themselves to accept the lowest or any Tender, and the party whose Tender shall be accepted will be required to provide two approved sureties for the due performance of the Contract. JOHN POLLARD, Clerk of the Board.

No. 1, Greek Street, Soho, Feb. 21, 1860.

TO PROVINCIAL GAS COMPANIES AND OTHERS.

WANTED, by the Advertiser, a Situation as MANAGER or FOREMAN in a Provincial Work. Is thoroughly acquainted with his business in all its branches; understands Book-keeping by double entry, and collecting accounts; will undertake the Main-laying and Gas-fittings, &c.; and has had the management of Gas-works for the last 15 years.

Testimonials and Security if required.

Address, W. D. A., 30, Paris Street, Palace Road, LAMBETH, S.

Feb. 15, 1860.

MANAGER Wanted for the GOTTENBURG GAS-WORKS, SWEDEN. He must be practically acquainted with the manufacture of Gas (from Newcastle Coals in Fire-Clay Retorts), its purification and distribution; must thoroughly understand the laying of Pipes and other Street-work; and be able to carry out additions and alterations in the Works, under instruction from the Company's Engineer. He must also be able to keep the usual Carbonizing accounts; and an acquaintance with gas accounts in general will be preferred.

The present production of gas is 20,000,000 cubic feet per year.

Residence &c. on the Works.

Applications, with testimonials and full particulars, to be addressed to Messrs. SCHILLER Brothers and Co., HAMBURG.

February, 1860.

GAS-WORKS.—NEW GASOMETER.

TO IRON-FOUNDERS, GASOMETER-MAKERS, AND OTHERS.

THE DEWSBURY and BATLEY GAS COMPANY are ready to receive Tenders for a Telescope GASHOLDER 160 feet diameter, and 50 feet high, with Cast-Iron Columns, Girders, Guides, &c., &c., all complete. To be erected at the New Works, near to the Batley Station, on the London and North Western Railway.

Plans and Specifications may be seen at the Office of the Gas Company, Dewsbury, from Monday, the 20th Day of February, to Thursday, the 8th of March next, the day of letting.

Sealed Tenders to be sent to WILLIAMSON METCALFE, Manager, Gas-Works, DEWSBURY.

GAS APPARATUS WANTED.

THE Directors of the Cork Gas CONSUMERS' COMPANY (LIMITED) request Tenders for the supply of a WET LIME PURIFIER, of 15 feet in diameter.

Also an OUTER LIFT for a Gasholder, upwards of 100 feet in diameter and 18 feet in depth.

Plans and Specifications may be seen here, or at the office of GEORGE ANDERSON, Esq., C.E., 104, Leadenhall Street, LONDON, Engineer to the Company.

The Directors do not bind themselves to accept the lowest tender.

Tenders must reach the Company's Offices before 12 o'clock on Saturday, the 17th of March next.

Company's Offices, 72, South Mall.

Feb. 18, 1860.

TO GASHOLDER MAKERS AND IRON FOUNDERS.

THE Directors of the Newmarket GAS COMPANY are prepared to receive Tenders accompanied with Plans and Specifications, for the erection of a CAST-IRON TANK and TELESCOPE GASHOLDER, with Columns, Girders, &c., complete. The Tank not to exceed 24 feet diameter, and the Gasholder to contain not less than 10,000 cubic feet.

The Specifications to include the erection of the Tank and Holder at the Works in Newmarket, with all necessary Pipes to connect the Holder with the present Works.

The Directors will receive separate Tenders, one for the Tank, fixed complete, and the other for the Gasholder, with the Columns, Girders, &c., also fixed complete.

The Tenders, &c., are to be delivered to the MANAGER at his office, Newmarket, on or before the 19th day of March next, endorsed "Tenders for Gasholder;" but the Directors do not bind themselves to accept the lowest or any Tender.

Further information may be obtained of the Manager.

Newmarket, Feb. 25, 1860.

TO GASHOLDER MAKERS, IRON-FOUNDERS, AND OTHERS.

THE Directors of the Over Darwen GASLIGHT COMPANY are prepared to receive Tenders for the Construction and Erection of a TELESCOPIC GASHOLDER, 102 feet diameter, in two lifts of 22 feet each.

The Plans may be seen and Specifications had on application to the Engineer, at the Works, Charles Street, Over Darwen, on and after Friday next, the 3rd day of February.

Sealed Tenders, endorsed "Tender for Gasholder," addressed to JAMES SHORROCK, Esq., Chairman of the Over Darwen Gaslight Company, to be sent in, on or before the 29th day of February next.

The Directors do not bind themselves to accept the lowest, or any Tender.

JAMES L. HAWTHORN, Engineer.

TO BUILDERS AND CONTRACTORS.

LEICESTER Gaslight Company.— Parties deirous of Contracting for the Erection of a Brick GASHOLDER TANK, 133 feet in diameter, and other works, at the Company's Station in Leicester, are requested to apply at our Office at any time from March 3rd to March 8th next.

Tenders will be required on March 10th.

The Directors of the Company do not pledge themselves to accept the lowest or any of the Tenders.

FLINT and SHENTON Architects.

Friar Lane, Leicester, Feb. 22, 1860.

FOR SALE, a Small Direct-Action STEAM-ENGINE, in good condition, 6-inch Cylinder, 12-inch stroke.

For particulars apply to the MANAGER, Worcester Gas-Works.

GAS APPARATUS.

TO be disposed of cheap, the under- mentioned Apparatus and Castings, viz:—

2 Dry-Lime Purifiers, complete, with Covers, Sieves, &c.;

8 Lengths of Hydraulic Main, with Stand, Arch, and Dip-Pipes;

30 Circular Retort Mouth-Pieces, and 60 Lids;

8 Furnace Doors and Frames;

A Governor with Cast-Iron Tanks, several Tar Cisterns, Hydraulic Cup Valves, and a large quantity of old Castings.

Particulars as to size, price, &c., will be forwarded on application to Mr. J. L. COCKER, Gas-Works, Merthyr Tydvil, GLAMORGANSHIRE.

GAS Apparatus of every kind, and their action explained and thoroughly tested as to the practicability of HEATING BATHS, Conservatories, Halls, Public Buildings, &c., for all kinds of Cooking and Domestic Purposes, at PHILLIPS'S MANUFACTORY, 55, Skinner Street, SNOW HILL, E.C. (the Original Inventor and Patentee), Gas-Fitter by appointment to Her Majesty's Government and many of the Nobility.

N.B.—An assortment of Hughes's Patent Safety Atlas Chandeliers, and all kinds of Gas-fittings of a superior style and workmanship.

GAS ENGINEERING AND GENERAL IRON-WORKS COMPANY (LIMITED).

THIS Company is formed for the purpose of erecting Gas-Works, Roofs, Boilers, Engines, and Iron-Work of every description, for London, the Provinces, and Continental Cities. The Directors, have purchased an old established concern, in full work, possessing ample machinery, and every convenience for carrying on a large business, and have secured as practical Manager a gentleman who has been engaged for upwards of Thirty years in erecting Gas-Works in various parts of the Kingdom.

The advantages accruing to the shareholders in the undertaking are fully detailed in the prospectus. It is neither a new or speculative project; but, by the addition of further capital, the Company are extending a sound and healthy business, which has yielded for years past more than 20 per cent. on the capital invested.

Prospectuses, with full particulars, and forms of application for the remaining Shares, can be obtained at the Offices of the Company, 11, Pancras Lane, Queen Street, E.C.

The Company is prepared to make Plans and Estimates for any of the above work, on application.

CAUTION.

TO GAS-METER MANUFACTURERS AND OTHERS.

THE Undersigned hereby caution Meter Manufacturers and others against infringing the exclusive right of the Undersigned to the use of the Screw Adjustment for regulating the Height of the Overflow-Pipes in Wet Gas-Meters, as described in the Specification of the Letters Patent granted to Crosley and Goldsmith on the 19th of April, 1856; as well as against infringing any other portions of that or any other Patent of the said William Crosley; and

NOTICE is further given, that all Infringers of the said Inventions, or any portions of them, will be proceeded against. CROSLEY & CO.,

103, SOUTHWARK BRIDGE ROAD, LONDON, Aug. 29, 1859.

TO GAS & WATER COMPANIES, ENGINEERS AND FITTERS.

GARSIDE'S Registered Tube-Vice holds all sizes of Wrought-Iron and Brass Tubes with the greatest firmness and least possible pressure; consequently it is not so liable to split or damage the Tubes as the ordinary Vice, and considerably facilitates the Workman, who may do almost double the quantity of work. Also,

GARSIDE'S IMPROVED MAIN-DRILLING CLIPS, for Drilling Holes for Service-Pipes. With this instrument the perforation of Pipes for the attachment of smaller Tubes can be effected with great ease and precision. Likewise,

HEAP'S REGISTERED GAS TONGS, most highly approved of as vastly superior to those in present use. Stocks, Taps, and Dies, together with all tools connected with Gas Engineering.

For Drawings, Testimonials, and prices, apply to the Maker, S. GARSIDE, Stamford St., ASHTON-UNDER-LYNE.

GAS PURIFYING BY REVIVIFIABLE OXIDE OF MANGANESE.

MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) begs to inform Gas Engineers that they may now supersede the material in general use by A REVIVIFIABLE OXIDE OF MANGANESE of his preparing, which in efficacy is at least equal, and in economy superior, to Oxide of Iron. Owing to the greater chemical activity of Manganese, common dry-lime purifiers of ordinary capacity will often be amply sufficient for it, though they may be too small for the Oxide of Iron material.

For Gas-Works possessing steam power, more especially such as are exposed to public complaint, Mr. Laming recommends the purification to be done either wholly or in part (depending on extent of apparatus) in out-of-doors scrubbers, hermetically sealed, by means of his liquid process, which is both economical, and meets all practical requirements.

118, Fenchurch Street, Aug. 1, 1859.

JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.
Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.
LONDON HOUSE:
12, ROYAL EXCHANGE BUILDINGS.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

GAS, WATER, MINING, AND GENERAL ENGINEERING.
MR. PRESTON LUMB having changed his Offices to 16, NORTHUMBERLAND STREET, STRAND, W.C., feels it incumbent upon him to announce to his clients and others that he may be consulted (from 10 to 5) in every branch of Engineering. His twenty-five years' experience and success, *especially in the construction and leasing of Gas-Works*, has enabled him to increase his hitherto extensive and efficient staff, so that Boards of Directors may confidently rely upon his prompt attention. He has also the command of a large amount of Capital for Engineering enterprise.
London, 16, Northumberland Street,
Strand, W.C., Jan., 1860.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

JAMES NEWTON,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANT,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON.
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and CLAY,
and every Article suitable for
GAS AND WATER WORKS.

WEST and GREGSON, Gas-Meter MANUFACTURERS, &c.
UNION STREET, OLDHAM.
Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.
W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

WHITEHOUSE and CO., Boiler and GASHOLDER MAKERS,
GLOBE PATENT TUBE WORKS,
WEDNESBURY,
Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.
Orders promptly executed.

TO Mr. BENJAMIN WHITEHOUSE,
GASHOLDER MAKER,
WESTBROMWICH, NEAR BIRMINGHAM.
Sir,—I feel great pleasure in expressing my satisfaction at the manner in which you discharged your duties as CONTRACTOR for the TELESCOPIC GASHOLDER, 150 feet diameter and 60 feet deep, erected at this Company's Nine Elm Station in 1857. From that period to the present I have closely watched its working, and have never found the least defect either in workmanship or material.
During the recent heavy gales the Gasholder, although containing upwards of 1,000,000 cubic feet of Gas, showed no perceptible indications of its influence, but worked as freely and easily as usual.
RICHARD JONES.
Engineer to the London Gaslight Company.
Vauxhall, London, Nov. 9, 1859.

LESMAHAGO GAS COAL.
JAMES FERGUSON and CO., Lessees of the Auchinheath and Craignethan Gas Coalfields (the most extensive and valuable in the parish of Lesmahago), respectfully intimate to the Managers of Gas-Works and Consumers of Gas Coal, that they are prepared to ship the best quality of the above well-known COALS at Glasgow or Leith; and also to deliver them at the railway stations upon, or connected with, the Caledonian Railway, to any extent which may be required.
Price, free on board, or delivered at the railway stations, may be learned by addressing James Ferguson and Co., Gas-Coal Works, Lesmahago.
Shipping Agent for Glasgow:
MR. ALEXANDER STRATTON,
159, WEST GEORGE STREET.

WM. RICHARDSON and CO.,
SPRING GARDEN IRON-WORKS,
DUDLEY, near BIRMINGHAM,
Manufacturers of Gas Apparatus in all its branches.
A large assortment of New and Second-hand Gas Apparatus constantly for Sale.
Gas Apparatus Enlarged and Exchanged.

LEONI'S Patent Adamas Gas-BURNERS (secured by Her Majesty's Royal Letters Patent), are entirely free from liability to CORROSION, injury from Heat, or danger of Fracture, and are UNALTERABLE in the dimensions of their Apertures.
Uniformity in the consumption of Gas is obtained by the process of manufacture, which ensures that the Burners shall be of precisely similar pattern.
The Adamas Burners are confidently recommended to Gas-Fitters, Consumers, and Companies.
Sole Manufacturer and Patentee in Great Britain, S. LEONI, Adamas Works, St. Paul Street, New North Road, LONDON, N.

JOSEPH WILLCOCK
(late BARLOW and CO.),
Mechanical and Architectural Draftsman, Designer, Serveyor, and Lithographer to Gas Engineers and Gas Apparatus Manufacturers, formerly Superintending Engineer at the largest Gas Apparatus Manufactory on the Continent.
Patent and Designs Office, 89, Chancery Lane, LONDON, W.C.

CHARLES BOTTEN and SON, ENGINEERS & METER-MAKERS,
CRAWFORD PASSAGE, RAY STREET,
CLERKENWELL, LONDON (E. C.).
Manufacturers of Station and Patent Protector Consumers' Meters, Patent Slide-Valves, Gas-Fittings, Pipes, &c.
Also, High-pressure Cocks, Hydrants, Closets, and all Water-Fittings.

WILLIAM STEPHENSON & SONS, THROCKLEY,
NEWCASTLE-ON-TYNE,
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE BRICKS, CLAY RETORTS, LUMPS, TILES,
&c. &c.
LONDON OFFICES:
76, KING WILLIAM STREET, CITY.
A large stock of Fire-Clay Goods always on hand in London, at the lowest wharf prices, at Messrs. CHRISTIE & Co.'s Wharf, 64, Bankside, SOUTHWARK.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

GEORGE ANDERSON, Gas and CONSULTING ENGINEER,
104, LEADENHALL STREET, LONDON (E.C.).
DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.
FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.
RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.
Illustrated circulars, giving references and every information, may be obtained on application as above.

ALFRED PENNY, Engineer,
WENLOCK IRON WORKS,
WHARF ROAD, CITY ROAD, LONDON.
Mr. PENNY begs to inform Gas and Water Companies that he undertakes the erection of new, or the alteration of existing, works; and that he may be consulted generally on all matters connected with gas and water supply. He is also prepared to supply best Cold-blast Retorts, Socket-Pipes, and Connections, Iron Borings, &c. &c., and all the necessary Castings used in Gas and Water-Works.
*** Country orders executed with care and despatch.

CANNEL and COAL of the best descriptions for making GAS and COKE.
(As per Analyses.)
GAS CANNEL, 17s., 15s. 6d., and 14s. per ton.
GAS COAL, 11s. 6d., 9s. 6d., and 8s. 6d. per ton.
STEAM COAL, 10s., 9s. 6d., and 9s. per ton.
All free on board Vessels in Liverpool.
Handpicked Cannel and Coal about 10 per cent. additional. Concession in prices made for large quantities.
GAS APPARATUS of all descriptions, and on the most approved principles; also Purifying and other materials supplied.
ANALYSES, PLANS, and ESTIMATES, and other information required, and the highest references furnished on application.
CONTRACTS for Materials and Works entered into.
No charge made for Superintending Shipments, Preparing Bills of Lading, or passing Entries.
EMANUEL TURNER and CO.,
EXPORT OFFICES:
34, CASTLE STREET, LIVERPOOL.

PADDON AND FORD,
GAS-METER AND APPARATUS WORKS,
GRAY'S INN ROAD, LONDON.
MANUFACTURERS OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, EXPERIMENTAL APPARATUS, &c. &c.
Sole Manufacturers of Sanders's Patent Compensator for maintaining a correct Water-Level in the Meter without impeding its legitimate action.
All Meters manufactured by P. and F. are guaranteed to be in strict conformity with Lord Redesdale's Sale of Gas Act.
A large number of **STATION-METERS,** up to 80,000 feet per hour (being by far the largest in use), and **GOVERNORS** for **MAINS,** up to 24 inches, have been constructed by Paddon and Ford. These Meters and Governors possess peculiar advantages as regards strength and freedom of action. The Meters are warranted to offer less resistance than Meters generally.
Manufacturers also of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.
Contractors for the erection or alteration of Gas-Works, and every description of apparatus required in Gas-Works supplied.

BENT AND SON,
2 & 3, BELL-BARN ROAD, BIRMINGHAM,
(ESTABLISHED 1830,)
Manufacturers of
J. C. BENT'S PATENT COMPENSATING GAS-METER;
Also of
ALLAN'S PATENT COMPENSATOR,
Both of which are warranted to meet the requirements of the SALE OF GAS ACT.
Station-Meters. Street Lamps of all kinds, plain and ornamental.

BOULTON'S PATENT DRY GAS-METERS,

Of which upwards of 24,000 are at present in use, having gained for themselves an unparalleled patronage from all the principal Gas Companies and Consumers, on account of their unerring registration and the superior workmanship and materials used in their construction, enables the Patentee to sell them now at competitive prices with those of other makers.

Every description of Improved Wet or Patent Dry Meters and Gas Apparatus manufactured by

JOSEPH BOULTON,

28, BAGNIGGE WELLS ROAD, CLERKENWELL.

All Meters warranted to comply with the requirements of Lord Redesdale's "Sale of Gas Act."

WILLIAM SUGG,

GAS ENGINEER, AND MANUFACTURER OF GAS APPARATUS, METERS, PHOTOMETERS, GOVERNORS, &c.,

MANUFACTURER OF

THE NEW EVANS PHOTOMETER,

Suggested by Mr. F. J. EVANS, Engineer of the Chartered Gaslight Company.

The advantages of this Photometer consist in not requiring a Dark Room, as it is complete in itself. It can be used in any ordinary Room, by daylight, or in the open air if necessary. The results obtained by it are much more accurate than by any other Photometer at present in use, while the manipulation is so easy and pleasant that an experimenter may operate for hours together without fatigue to the eyes. This alone is an advantage which all who make such experiments will fully appreciate.

One of these instruments, fixed in working order, can be seen and tested at the Manufactory, 19 and 20, Marsham Street, Westminster, where all further particulars may be obtained.

MANUFACTURER ALSO OF

EXPERIMENTAL METERS AND GOVERNORS

for use with the above,

MINUTE CLOCKS, TESTING GASHOLDERS,

AND GENERAL EXPERIMENTAL APPARATUS OF THE BEST QUALITY.

STATION METERS, STATION GOVERNORS,

IMPROVED CONSUMERS' DRY METERS AND COMPENSATING, WATER-BOX, ENCLOSED FLOAT,

and other kinds of Water-Meters, all to suit the New Gas Act.

STREET LAMP GOVERNORS,

fitted with cased Lava Burners, regulated to burn any required quantity per Hour, which quantity they will maintain under any excess of Pressure.

LAVA BURNERS,

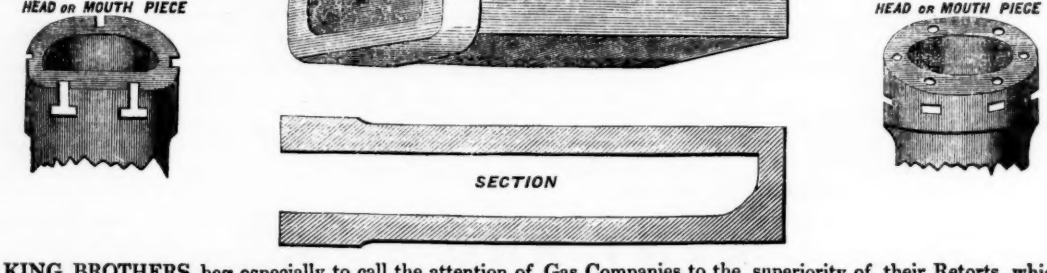
ARGAND PHOTOMETER 15-HOLE PARLIAMENTARY BURNERS, ARGAND DRILLED AND SUN-RING BURNERS, DOUBLE BATWING, BATWING AND FISHTAIL, STAR, CRESCENT, AND FIR-TREE BURNERS, AND BUNSEN CHEMICAL BURNERS.

GAS-METER AND APPARATUS WORKS,

19 and 20, MARSHAM STREET, WESTMINSTER.

KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS,



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

FREE FROM CRACKS AND CORRECT IN FORM.

By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABBITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

Every Retort and Brick is branded "King Brothers, Stourbridge."

CROSLEY & GOLDSMITH'S

PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS

CANNOT BE OVER OR UNDERCHARGED WITH WATER,

and they consequently register the quantity of Gas consumed with greater accuracy than Meters in which the Water-Line is variable.

MANUFACTURED BY

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.

N.B. The Patent Self-Adjusting and Compensating Apparatus may be applied to the ordinary Meter.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENT METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

C. and Co. are the only house in the trade which has for years manufactured Meters according to the standard measure set forth in the 2nd Section of the "Sale of Gas Act," and which also comply with the rules laid down in the Section for testing meters. Purchasers of C. and Co.'s Meters may therefore be secured against any additional expenses being incurred in order to adapt their Meters to the requirements of the new Act.

WILLIAM PARKINSON AND CO.,

(SUCCESSORS TO THE LATE SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.,

PATENTEES AND MANUFACTURERS OF

GAS-METERS, GOVERNORS, AND OTHER APPARATUS;

ALSO,

METERS FOR MEASURING WATER, &c., &c.

IMPROVED LOW-SPOUTED GAS-METERS,

Which completely meet the requirements of Lord Redesdale's Sale of Gas Act, and are as simple in their construction, satisfactory in working, and as low in price as the well-known Meters which have been made by W. P. and Co., and their predecessor, Mr. Samuel Crosley, during the last forty years, and of which there are about 300,000 now in use.

STATION-METERS AND GOVERNORS

Of all Sizes, of the best Construction, Materials, and Workmanship, supplied on he shortest notice.

There are about 300 Station-Meters at work of their manufacture, of sizes varying from 750 to 60,000 cubic feet per hour, of which the following are some of the principal ones, recently supplied by them to London Gas Companies, viz. :—

2	for	60,000	cubic feet per hour each	to the Chartered Gaslight and Coke Company, Westminster;
1	,,	40,000	,, ,,	Chartered Gaslight and Coke Company, Brick Lane;
2	,,	60,000	,, ,,	London Gaslight Company, Vauxhall;
1	,,	60,000	,, ,,	Commercial Gas Company, Stepney;
1	,,	40,000	,, ,,	Equitable Gas Company, Pimlico;
1	,,	40,000	,, ,,	Phœnix Gaslight Company, Greenwich,

&c. &c. &c.

And they have also supplied large Station-Meters to the Gas Companies at Birmingham, Nottingham, Sheffield, Southampton, Leeds, Newport, Glasgow, Manchester, Dublin, Cork, and all the principal towns in the United Kingdom, as well as many on the Continent, &c., &c.

Their Station Gas-Governors have been adopted by most of the above-named Companies, and have given universal satisfaction.

PRESSURE REGISTERS, EXPERIMENTAL METERS, PHOTOMETERS,

Minute Clocks, Consumers' Gas-Governors, Pressure-Gauges,

STANDARD EXPERIMENTAL GASHOLDERS FOR PROVING METERS, &c.

GEORGE LOWE'S PATENT NAPHTHA BOXES AND MOTIVE-POWER METERS,

WITH MACHINERY FOR WEIGHTS TO ASSIST THE SUPPLY OF GAS WHERE THE PRESSURE IS LOW.

SPECIFIC GRAVITY APPARATUS, RAIN GAUGES, &c.

EDWIN DIXON,

WOLVERHAMPTON PATENT WROUGHT-IRON TUBE WORKS,
Originally established in 1833,
Manufacturer of Gas and other Tubes, Fittings, and articles of every description belonging to Gas, Water, or Steam.

E. D. had the honour of receiving the

PRIZE MEDAL

awarded to this Manufacture by the COUNCIL of the GREAT ENGLISH EXHIBITION of 1851; and from the latter date has supplied many towns exclusively with GALVANIZED and other Tubes for Gas and Water, under GOVERNMENT ENGINEERS.

A City, containing 150,000 inhabitants,

has recently been entirely supplied with Tubes made at the above-named Works, and several others with populations nearly as great; in fact, the reputation now acquired induces this notice to the public.
Large Stocks generally on hand, averaging from one to three hundred thousand feet.

HYDRAULIC PRESS TUBES,
to resist 6000 lbs. and upwards to the square inch, extensively manufactured.

STOCK DIES and SCREWING TACKLE
of the best possible description.
Every Tube carefully tested with Hydraulic Pressure before leaving the Works.

WALTER MABON, Engineer,

ARDWICK IRON WORKS, FAIRFIELD STREET
MANCHESTER,
Manufacturer of
IRON TANKS for Gasholders, Railway Stations, &c.
GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.

GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.

WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.

IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.

PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

FIRE-CLAY RETORTS.

JOHN SWARBRICK,

MANUFACTURER OF PATENT COMPOSITION CLAY RETORTS,
FIRE BRICKS OF EVERY DESCRIPTION, SHAPE, AND SIZE, &c. &c.
HIGHER EANAM, BLACKBURN, LANCASHIRE.

These RETORTS are generally used in the Gas-works of Preston, Accrington, Bury, Heywood, Middleton, Rochdale, Ratcliffe; the Mills of Messrs. Horrocks, Miller, and Co., Preston, &c. &c., and are unequalled in having afforded general satisfaction to those who have given these Retorts a trial.
To meet the increasing demand, the Works at Little Harwood have been greatly enlarged; and Gas Engineers who may favour with an Order may rely with confidence on their being promptly supplied with an article not to be surpassed in finish or durability.

PRICES MODERATE.

LIVESEY FIRE-CLAY WORKS,

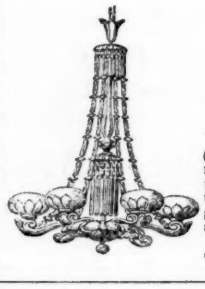
NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,
AND EVERY DESCRIPTION OF
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.
FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

JAMES OAKES and CO.,

ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
CHARLES HORSLEY, Agent.
C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.

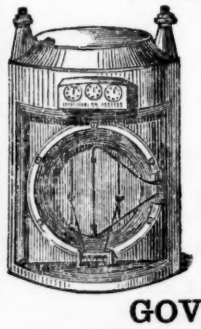


F. & C. OSLER,

45, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards
(Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

JAMES MEACOCK,

PATENT DRY AND WET GAS-METER MANUFACTURER,
7, SNOW HILL, AND 16, WEST STREET, LONDON.



ESTABLISHED 1836.

J. M. invites attention to his Improvements in **EXPERIMENTAL WET GAS-METERS**, by which he renders impossible any Leakage from the Stuffing-Box.

These METERS are GUARANTEED to meet all the REQUIREMENTS of the SALE OF GAS ACT.

GOVERNORS, STATION-METERS. PHOTOMETERS,
EXPERIMENTAL TESTING GASHOLDERS, HIGH-PRESSURE GAUGES,
AND ALL APPARATUS IN USE AT THE GAS MANUFACTORY.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

M. B. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

J. CLIFF'S Fire Bricks, Clay RETORTS, &c.

Orders for London and South of England to be addressed to Mr. NEWTON, Agent for the District, 16, Castle Terrace, New Hampstead Road, KENTISH TOWN, N.W.

N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

KINSON FIRE BRICKS are indestructible by heat, and are warranted to last twice as long as Stourbridge, Newcastle, or Welsh bricks. 80s. per 1000 at Nine Elms Station.

WORKS: POOLE, DORSET.

WILLIAM RYDER, General MINERAL AND METAL AGENT AND MERCHANT, 4, DEAN STREET, NEWCASTLE-ON-TYNE,

is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.

Any communications addressed to him as above shall have prompt attention.

WROUGHT-IRON Guides for Gas. HOLDERS, when Trussed upon scientific principles, are more capable of resisting strains, in every direction, than Cast Columns of any form can be; and weigh only one-fifth as much as the latter. Designs and Working Drawings for Guides and Ties can be obtained of the Inventor, CHARLES DIXON, C.E., Chichester, SUSSEX.

BENJAMIN GIBBONS, Jun., DEEPDALE FIRE-CLAY & BRICK WORKS, Near DUDLEY,

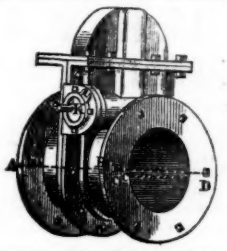
Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

FIRE-CLAY RETORTS,

TO MODEL OR DRAWING.

B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.

References given, if required.



BRYAN DONKIN & CO.

keep always on stock their

IMPROVED GAS VALVES

from 2 inches to 18 inches, price 11s. 6d. to 13s. 6d. per inch diameter

List of prices, with full dimensions of all sizes up to 27 inches, to be had on application.

These Valves are all proved to 30 lbs. on the square inch before leaving the works.

BRYAN DONKIN & CO.,

ENGINEERS,

NEAR GRANGE ROAD, BERMONDSEY.

BIRTLEY IRON WORKS, CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas Works and Water Works.

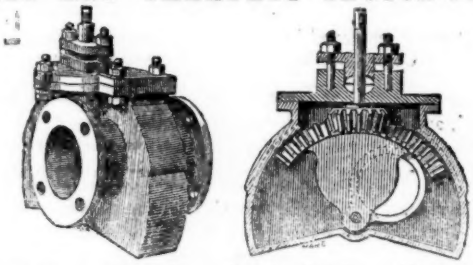
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

HARRIS and PEARSON PROPRIETORS OF BEST CLASS-HOUSE POT AND CRUCIBLE CLAY. MANUFACTURERS OF **FIRE BRICKS GAS RETORTS &C.** AMBLECOTE FIRE CLAY AND BRICK WORKS, STOURBRIDGE.

Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.

Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

NORTH WILTS FOUNDRY, DEVIZES.

Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C., Where a Sample may be seen.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.'s Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

SALE OF GAS ACT.

MESSRS. CROLL, RAIT, AND CO.,

Manufacturers of Croll's Patent Improved

DRY GAS-METER,

Also Manufacture and Supply

TEST GAS-HOLDERS,

And other Apparatus required by the Inspectors appointed in pursuance of the above Act.

Application for particulars to be made to the Factory,

CANAL BRIDGE, KINGSLAND ROAD, LONDON, N.E.

ALEXANDER WRIGHT,

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.,

MANUFACTURER OF

CONSUMERS' WET GAS-METERS,

Of the best material and workmanship, carefully adjusted to meet the requirements of the SALES OF GAS ACT.

CONSUMERS' COMPENSATING GAS-METERS,

Which have secured the highest approbation and patronage, on account of their simplicity of construction, thorough efficiency, and moderate price.

STATION-METERS AND GOVERNORS,

Of all sizes, constructed with the most careful regard to durability, accuracy, and freedom from excessive friction. A LARGE NUMBER are in use, and give perfect satisfaction.

EXPERIMENTAL TESTING APPARATUS,

COMPRISING

PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, BI-SULPHURET OF CARBON TEST, THOMPSON'S BROMINE AND HEATING POWER OF FUEL TESTS, IMPROVED ALKALIMETER, EXPERIMENTAL METERS AND GOVERNORS, MINUTE CLOCKS, &c., &c.

These apparatus are employed by the best experimenters in this country and on the continent, and by nearly all the Gas Companies in London, for the use of the appointed testers in the various districts.

WRIGHT'S REGISTERING PRESSURE-GAUGE,

Is universally used, and affords valuable aid in effecting a due regulation of pressure, thereby saving much of the leakage arising fromheavy pressures when the consumption is decreasing.

WRIGHT'S EXHAUSTER REGISTER and REGULATOR,

are of the highest utility, as by the one a due check is maintained on the working of the Exhauster, and by the other all possibility of excessive exhaust is avoided.

TEST GASHOLDERS,

Of all sizes, of the most perfect character, accurately graduated to the Exchequer Standard.

Consumers' Governors; Inspectors' Pocket, King's, and all other kinds of Pressure-Gauges; Thermometers for Condensers, &c., &c.

"Analysis of Gas for Practical Men," by A. WRIGHT, M. Inst. C.E., post-free for 13 Stamps.

PRICE-LISTS ON APPLICATION.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE, BLACK & GALVANIZED. COPPER. TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—60s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Joseph Clayton, 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, February 28, 1860.